THE

RUDIMENTS OF ARCHITECTURE:

OR, THE

YOUNG WORKMAN'S INSTRUCTOR.

IN TWO PARTS.

PART FIRST, CONTAINING

The five Orders of Columns entire, with Frontiſpieces, Doors, Windows, Porticoes, Intercolumniations, and Arcades, ſuited to each; Ruſtic Doors and Windows; Block and Cantaliver Cornices; Ruſtic; Quoins; the manner of conſtructing Brick and Stone-arches; Centuring for Groins and Vaulting; Stairs, Twiſted Rails, Roofs and Domes; Inſpectional Scales, Tables, &c. Directions for Drawing Plans and Elevations with Indian Ink: Likewiſe, the French and Spaniſh Orders.

PART SECOND, CONTAINING

Geometry; the Menſuration of Solids and Superficies; Plain Trigonometry, and Surveying of Land.

WITH

Twenty-four Elegant Deſigns of Buildings, the moſt of which have been actually executed in North Britain.

To which is added, The BUILDER'S DICTIONARY:
Intended for thoſe whoſe time will not allow them to attend TEACHERS.

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Andrew Cunningham Leuchar

May 13th 1824

PREFATORY INTRODUCTION.

THE *Science of* Architecture *is now-a-days held in ſuch univerſal and high eſtimation, that a theoretical knowledge of its Elements, at leaſt, is generally reckoned a part of genteel education. The practical part of Architecture, however, for the moſt part, falls to the ſhare of perſons who, either for want of opportunity to acquire information in this particular, or by inability to avail themſelves thereof, have been prevented from making ſuch proficiency as to be qualified, in any tolerable degree, even to execute plans put into their hands.*

To remove every impediment which has the leaſt tendency to obſtruct the knowledge of Architecture, as well in theory *as* practice, *from becoming general, and to make it level with the loweſt capacities, by application only, without the aſſiſtance of a maſter, (which is often not to be obtained, and always expenſive,) is the great object which the* Compilers *of the following Work have conſtantly kept in view.*

To effect this important end, the Compilers *have very carefully ſelected whatever is really uſeful in the moſt approved books on this ſubject; and, among other intereſting particulars, the juſtly celebrated* Inſpectional Scales *and* Tables *in the* London Art of Building, *in which, they will venture to ſay, the merit of that book chiefly conſiſts: So that they flatter themſelves the Readers will find, in the following ſheets, every thing truly valuable that has been publiſhed on this Science for the uſe of Workmen, without the expence and trouble (either of which are by no means ſmall) of purchaſing and peruſing the many volumes through which it is otherwiſe diffuſed.*

Much attention has been paid to the manner of arranging the Plates: That which is adopted is the one followed by the moſt experienced Teachers of this Art. A few remarks are here ſubjoined with regard to the order in which Learners ſhould conduct their ſtudies; an obſervance of which cannot fail to be truly uſeful.

The Orders are delineated upon a ſcale conſiderably larger than any publication of the like nature; a circumſtance which muſt make the ſmaller members ſo much the more diſtinct: That this advantage might be the more complete, each Order is divided at the ſhaft of the column, and each diviſion repreſented on a ſeparate Plate.

To avoid crowding the members with the figures, denoting their ſeveral heights and projections, the Compilers *have judged it proper to give them on tables immediately facing their reſpective Plates, with alphabetical references.*

The learner muſt firſt accuſtom himſelf to draw each Order by a ſcale of three inches to the module or diameter of the column, (which is ſomething larger than the one here given;) by the time he has thus gone through the Five Orders, he will tolerably underſtand the proportion of the different parts, and the method of deſcribing with the compaſſes the Cima rectas, Ovolos, *&c.*

The Learner may next proceed to draw the Orders *entire upon one ſheet of paper, by a ſmall ſcale, as they are repreſented on* Plate XI.

Frontiſpieces, &c. *to each Order come next in courſe to be drawn, each of which ſhould be done by a ſcale as large as the Learner finds convenient.*

In Plate XXV. *is given an elevation of a houſe, with plans and ſections; with a view to explain to the Young Workmen the manner of repreſenting windows, doors, vents,* &c.

That this Compilation might be more worthy of general attention, as a Second Part, the Elements of Trigonometry, Menſuration of Solids and Superficies, Surveying of Land, &c. *are added; all of which are properly illuſtrated with Plates.*

The Compilers, *who are verſant in this Science, have omitted nothing that can any way tend to the inſtruction of the* Young Workman, *and decline mentioning many other very uſeful pieces the Reader will have the ſatisfaction of diſcovering in the peruſal.*

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Twenty-four elegant Deſigns of Buildings, the moſt of which have been actually executed in North Britain; with Explanations to all the Deſigns.

The Builder's Dictionary, containing an Explanation of the terms made uſe of in Architecture; alſo, the terms of Art uſed by Workmen concerned in Building.

The Bookbinder will find directions for placing the Plates in page 128: And he is deſired to inſert the Explanations and Deſigns before the Builder's Dictionary.

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THE RUDIMENTS OF ARCHITECTURE, &c.

PART I.

CHAP I.

OF THE TUSCAN ORDER.

PLATE I. II.

THIS *Order* had its original in *Tuſcany*, a place very remarkable in Italy.

The ſhaft of this column is ſix diameters, the baſe and capital are each half a diameter: ſo that, including them, it is ſeven diameters high; it diminiſhes one fourth of the diameter: Its parts with their proportions are as follow.

TABLE *of the Proportions of the different Parts that conſtitute the* TUSCAN ORDER.

PLATE I.

	Principal parts.		Names of the members.	Heights.	Projections.
The whole height of the Entablature 105 min.	Cornice 44 min.	A	*Fillet*	3½	66
		B	*Cima Recta*	10	
		C	*Fillet*	2	56½
		D	*Corona*	10	54½
		E	*Ovolo*	9	41
		F	*Fillet*	2	32
		G	*Cavetto*	7½	24½
	Frize	H	*Frize*	26	22½
	Architrave 35	I	*Band*	5	27
		K	Second *Facia*	17½	24
		L	Firſt *Facia*	12½	22½
The whole height of the Column 7 Diameters.	Capital 30	M	*Abacus*	10	30
		N	*Ovolo*	10	29
		O	*Fillet*	1½	24½
		P	*Neck of the Capital*	8½	22½
	The height of the ſhaft 6 diameters.	Q	*Aſtragal*	4	27
		R	*Fillet*	1	24½
		S	*Diam. above*		22½

PLATE II.

	Principal parts.		Names of the members.	Heights.	Projections.
The whole height of the Column 7 Diam.	The height of the ſhaft, 6 diameters.	LM	*Diameter below*		30
	Baſe 30	A	*Fillet*	2½	33
		B	*Torus*	12½	40
		C	*Plinth*	15	40
The whole height of the Pedeſtal 2 Diam.		D	*Band*	9	50
		E	*Fillet*	2	46
		F	*Cavetto*	4	42
		G	*Die or Body of the Pedeſtal*	75	40
		H	*Cavetto Reverſa*	6	42
		I	*Fillet*	4	48
		K	*Plinth*	20	50

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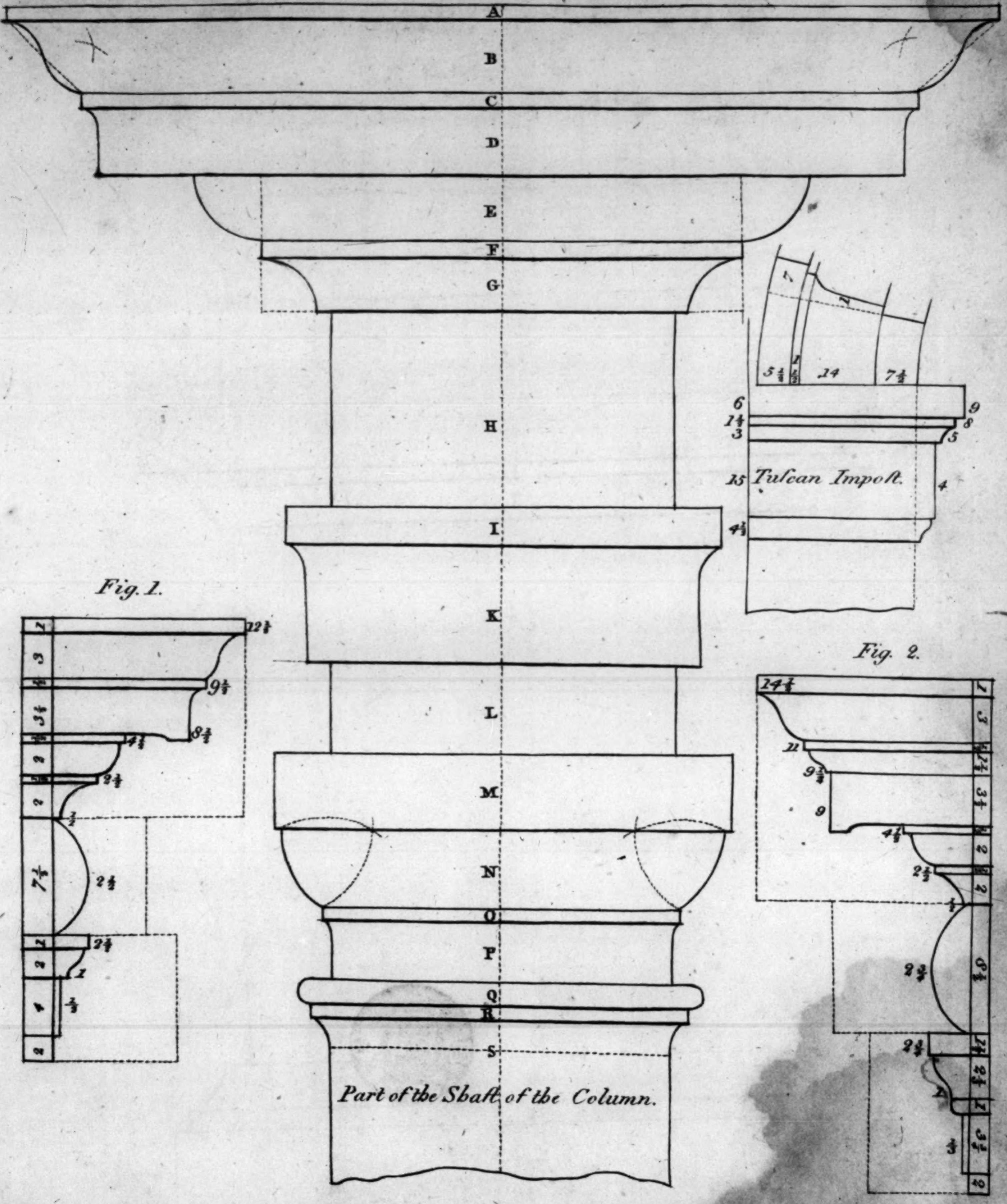
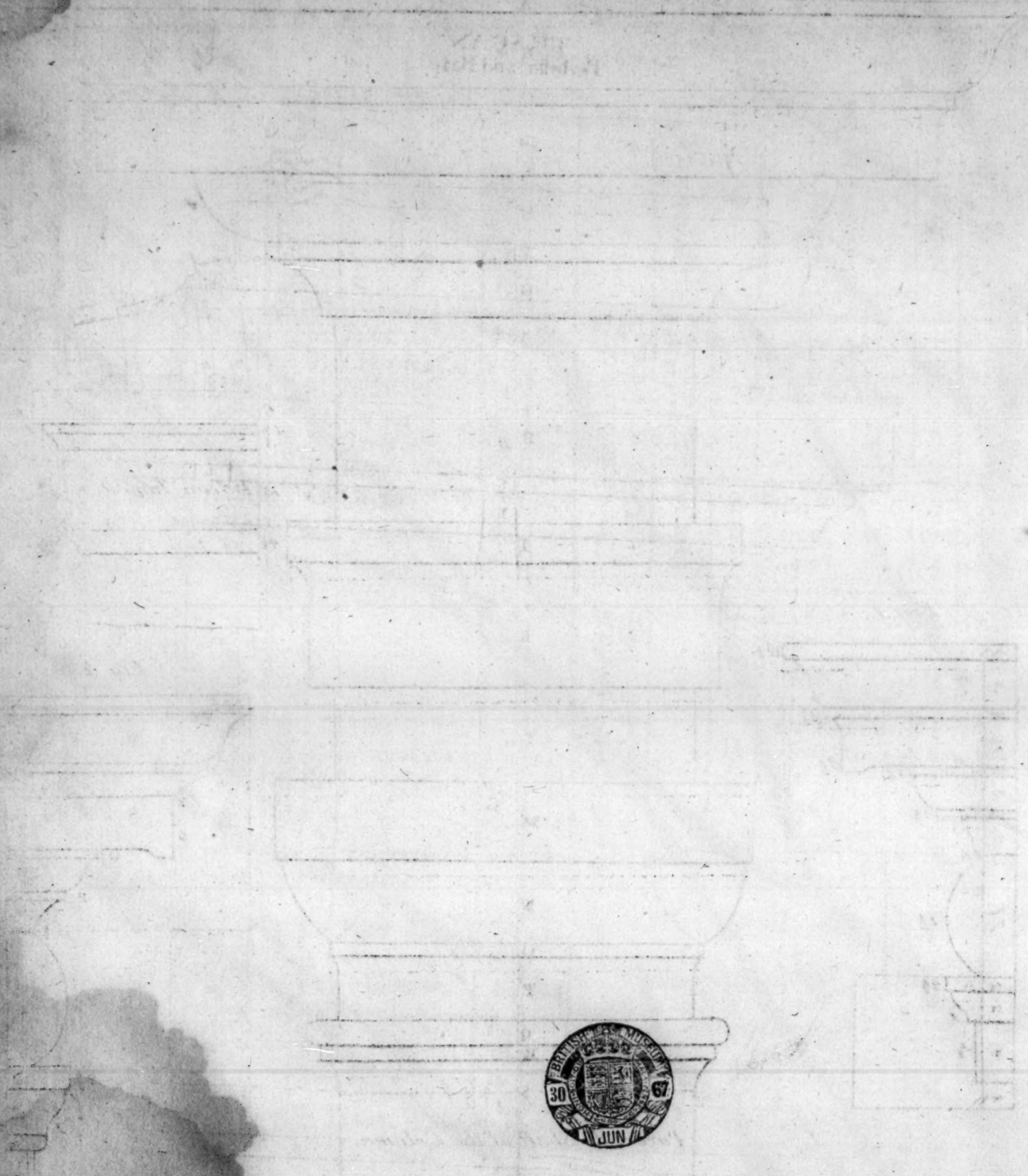
TUSCAN.


A
B
C
D
E
F
G
H
I
K
L
M
N
O
P
Q
R
S
Part of the Shaft of the Column.
Tuscan Impost.
7
2
5¼
1
14
7½
6
1¼
3
15
4½
9
8
5
4
Fig. 1.
1
3
3½
2
2
7½
1
2
4
2
12½
9⅓
8½
4½
2½
½
2½
2½
1
⅓
Fig. 2.
24½
11
9⅓
9
4½
2½
½
2¾
2½
1
⅓
1
3
2¼
3½
2
2
8¼
1½
2¼
1
3½
2



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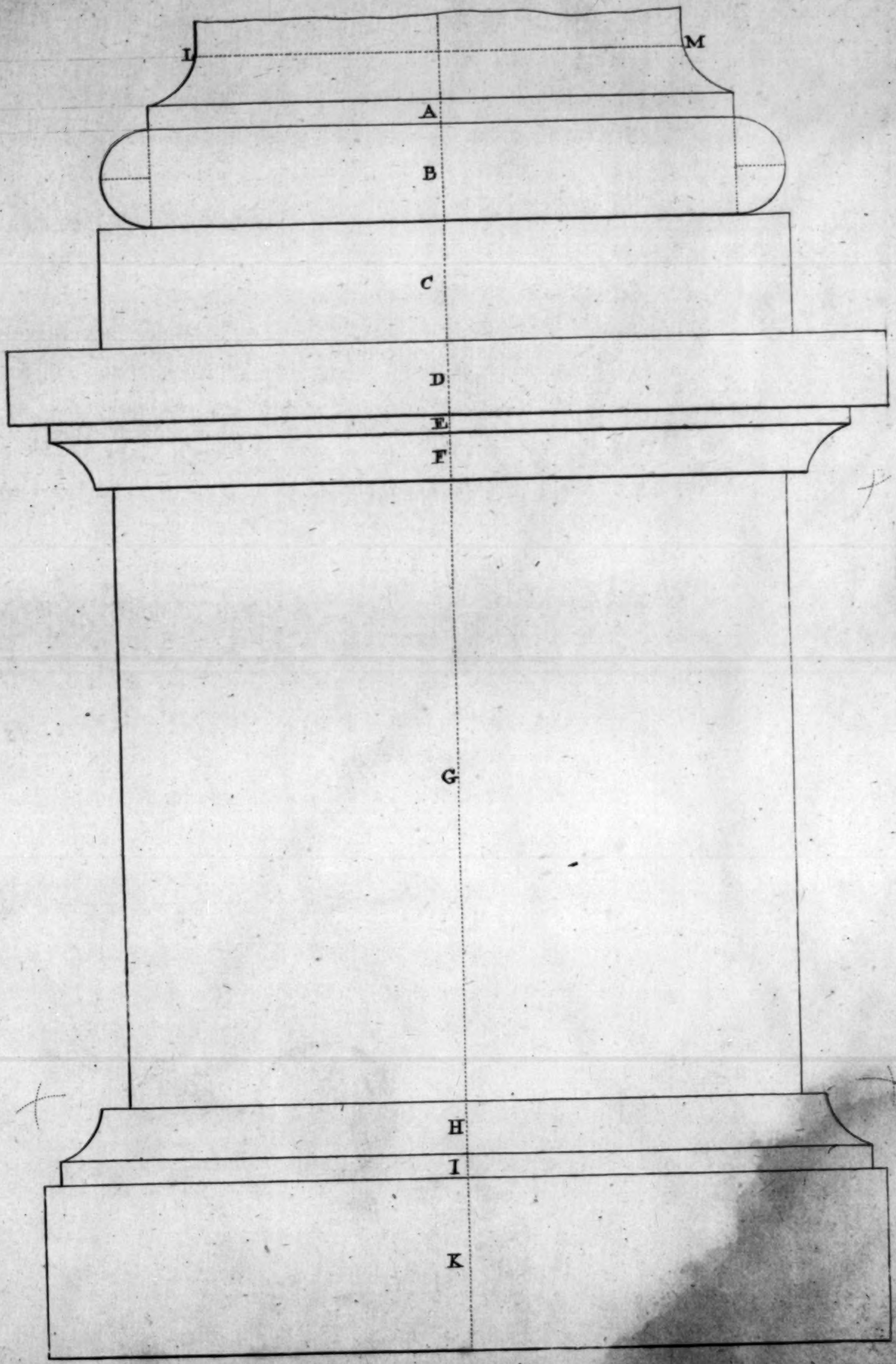
TUSCAN
Pedeſtal and Baſe



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To draw the Tuſcan Entablature and Capital, as on PLATE I.

Having faſtened your paper upon your draught-board by the help of your tee-ſquare, draw the upper line of the member A at ſuch a diſtance from the head of your paper as you ſhall think neceſſary for a proper margin; from which line let fall a perpendicular in the middle of your paper, as you ſee the pricked line marked with A B C, &c.: Now, as the *Entablature* and *Capital* of the *Tuſcan* Order is 2½ diameters, you therefore muſt divide your paper into 9 equal parts from the croſs line at top, leaving a larger margin at the bottom, to ſhew part of the ſhaft of the column, (as the 2¼ diameter only reaches to *k*); take 4 of thoſe 9 parts, which is the diameter or module to work by, which you ſet off upon the ſcale of modules and minutes, delineated *Plate* xx. *fig.* 2. as directed by its deſcription. After this module is divided into minutes, caſt your eye upon the table of proportions and oppoſite to A, which is the member, the line acroſs the head of your paper conſtitutes the upper part; it is called a *fillet*, whoſe height is 3½ minutes; take 3½ from your ſcale, and mark it down from the upper line upon the perpendicular or central line. The next member B is the *cima recta*, whoſe height is 10 minutes; take 10 from your ſcale, and mark it down as you have done the fillet, and ſo with the reſt of the members, till you have them all marked upon the central line; then apply your tee-ſquare to your board, and with a black lead-pencil draw lines through every one of your points, ſo far on each ſide of the central line as you think the reſpective members project.

You then proceed to the returning of the members. You ſee by the table, that the fillet A projects on each ſide the central line 66½ minutes; take 66½ from your ſcale, and ſet the one point of your compaſſes in the central line at A, and with the other mark on each ſide 66½, draw that with your pencil to form the fillet; as the projection of *cima rectas* are determined by their upper and lower members, you proceed to the fillet C which is 56½ minutes; take that from the ſcale; ſet the point of the compaſſes in the central line at C, and mark it on each ſide as you did the upper fillet A; in the ſame way go on with all the ſquare members till you have them all formed, leaving the returning of the curved or round members till the laſt. You will ſee the manner of deſcribing by the pricked line, where theſe interſect is the centres to turn them by.

C H A P. II.

OF THE DORIC ORDER. PLATE III. IV.

THIS *Order* had its original and name from the *Dorians*, a Grecian people which dwelt in Aſia.

The ſhaft of this column is 7 diameters; the baſe and capital are each half a diameter, which makes the column (including the baſe and capital) 8 diameters high; it diminiſhes $\frac{2}{15}$ of its diameter; the entablature is 2 diameters, or $\frac{1}{4}$ of the height of the column; the *trigliphs* are each 1 diameter wide, and ſo are the *bells* that are placed under them; the metops (or ſpaces between the trigliphs) are ſquare; Its parts with their proportions are as follow.

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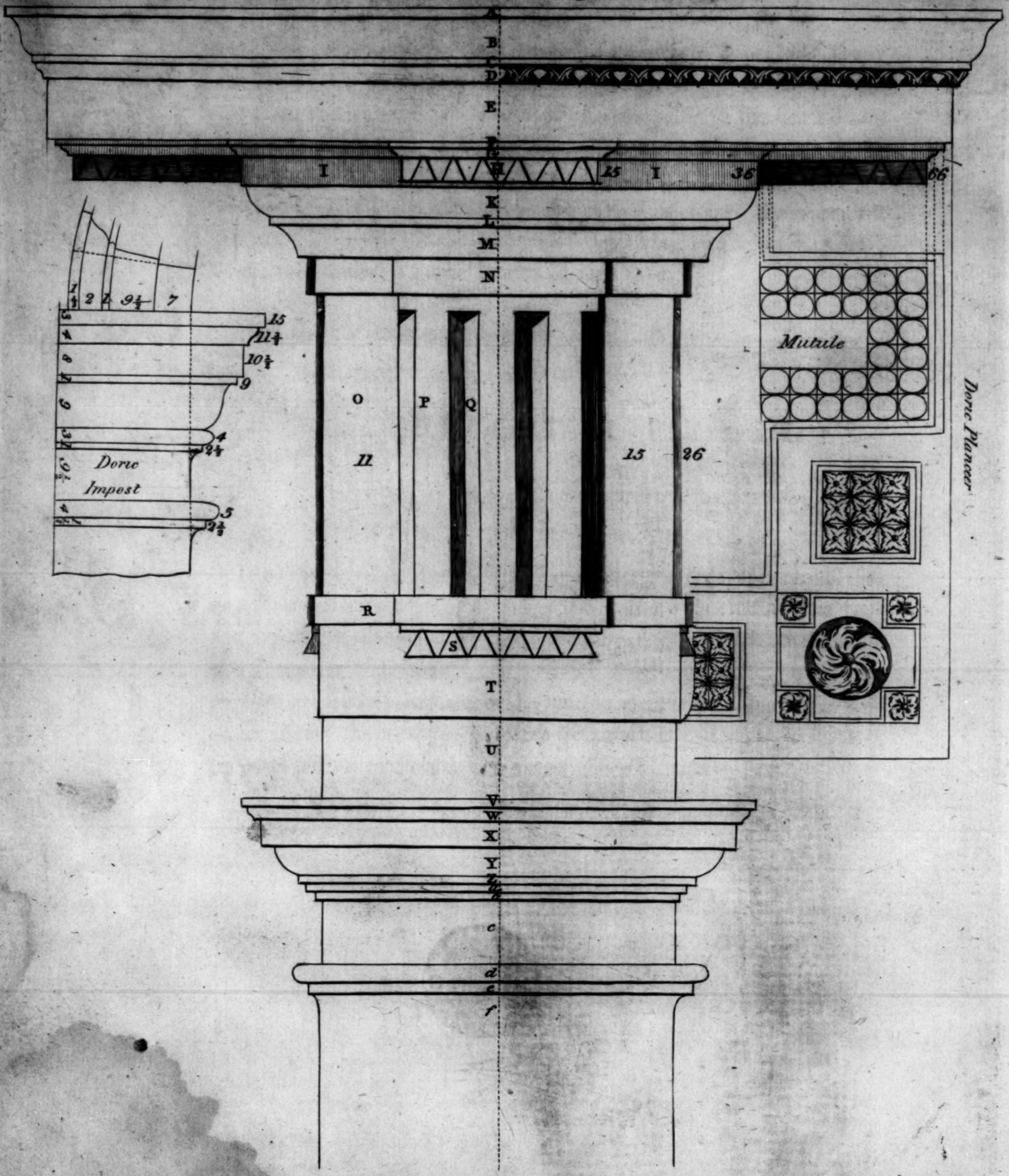
DORIC
Entablature and Capital.

Plate III.



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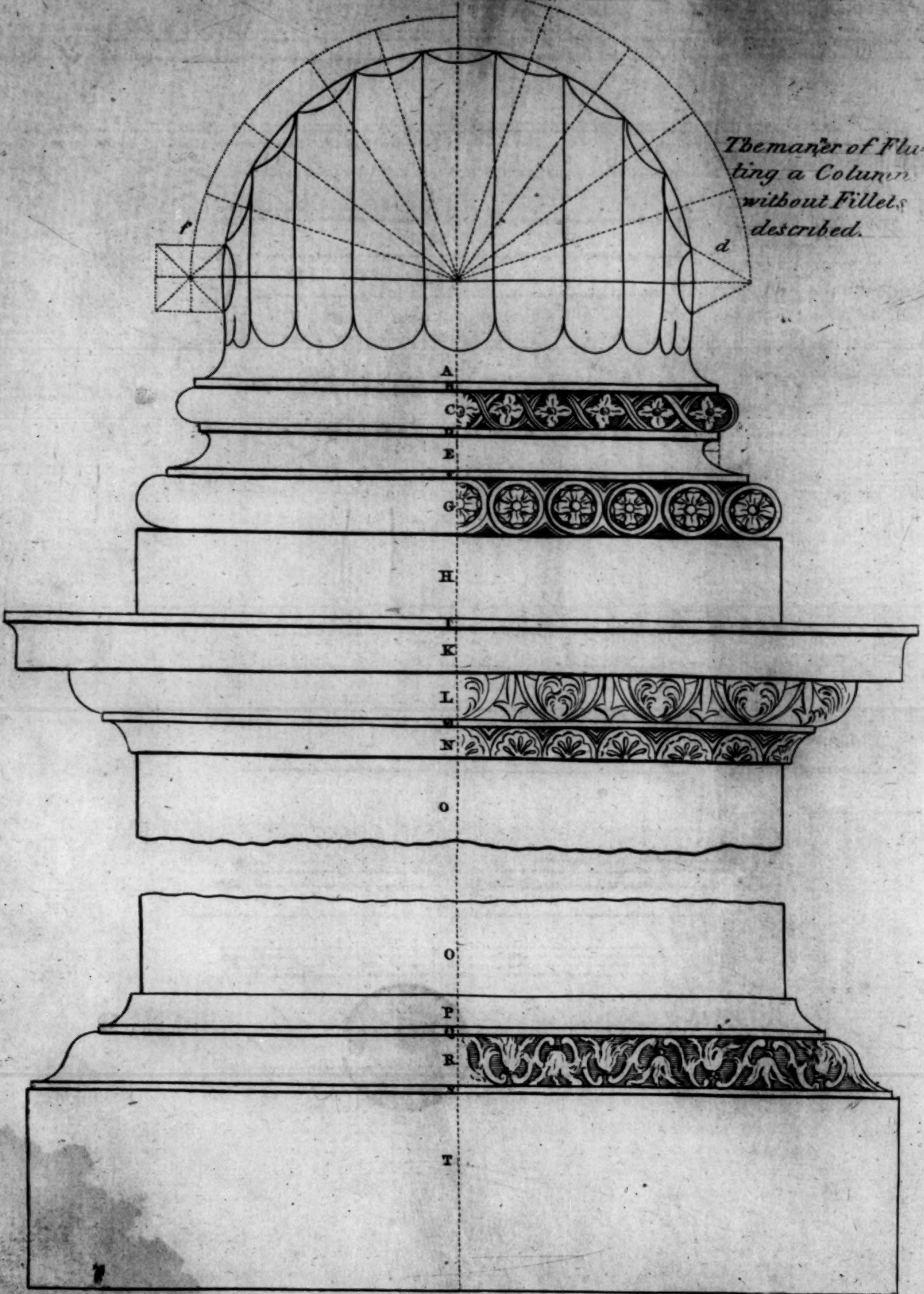
DORIC
Pedeſtal and Baſe.

Plate IV.



The man̄er of Fluting a Column without Fillets described.

PLATE III.

	Principal parts.		Names of the members.	Heights.	Projections.
The whole height of the Entablature is 2 Diameters.	Cornice 45 minutes.	A	*Fillet*	2¼	82
		B	*Cima Recta*	7¼	
		C	*Fillet*	1	74
		D	*Cima Reverſa*	3½	73
		E	*Corona*	8½	70
		F G	*Cap of Mutule, a fillet ¾ high, and a Cima Reverſa 1¾, is both*	2½	68
		H	*Mutule*	¼	66
		I	*Plain*	5	36
		K	*Ovolo*	5	33½
		L	*Fillet*	⅔	33½
		M	*Cavetto*	4¼	31
		N	*Cap of Trigliphs*	5	27
	Frize 45	O	*The naked Frize*	45	26
		PQ	*The Trigliphs*		
	Architrave 30	R	*Tenia*	4½	27
		S	*Guttæ, its fillet* 1⅓ *drops* 3⅓	5	15
		T	Second *Facia*	9½	26½
		U	Firſt *Facia*	11	26
	Capital 30	V W	*Cymatium, its fillet* 1⅓, *Cima Reverſa* 2⅔	4	39
		X	*Corona*	6	36
		Y	*Ovolo*	6¼	35
		Zab	*Annulets*	3⅓	29½
		c	*Frize or Neck of the Capital*	10	26
	Shaft 7 Diam.	*d*	*Aſtragal*	3½	30
		e	*Fillet*		28
		f	*Body above*	1½	26

PLATE IV.

	Principal parts.		Names of the members.	Heights.	Projections.
The whole height of the Column, including Baſe and Capital is 8 Diameters.	Baſe 30	A	*Body below*		30
		B	*Fillet*	1	33
		C	*Upper Torus*	5	36½
		D	*Fillet*	1	34
		E	*Scotia*	5	
		F	*Fillet*	1½	36
		G	*Lower Torus*	7½	40
		H	*Plinth*	10	40
The whole Height of the Pedeſtal 2 Modules, 20 Minutes.	20 Min. high	I	*Fillet*	2	58
		K	*Corona*	6½	56
		L	*Ovolo*	6	50
		M	*Fillet*	1	45
		N	*Cavetto*	4	41
		O O	*Die or Body of the Pedeſtal*	80	40
	Min.	P	*Cavetto Reverſa*	4	41
		Q	*Fillet*	1	45
		R	*Cima Reverſa*	7½	52
		S	*Fillet*	1½	52
		T	*Plinth*	26	54

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CHAP. III.

OF THE IONIC ORDER.

THE *Ionic Order* had its original in *Ionia*, a province in Aſia; a perſon of the name of *Ion* in that province having firſt invented it, who is ſaid to have erected a temple of this order to the Goddeſs Diana.

This column with its baſe and capital is 9 diameters, and diminiſhes $\frac{2}{15}$ of its diameter; its entablature is equal to $\frac{1}{5}$ of the height of the column; the pedeſtal is 2 diameters 42 minutes. The parts, with their heights and projections, are as follow:

PLATE V.

	Principal parts.		Names of the Members.	Heights.	Projections.
The Height of the Entablature 108 Minutes.	Cornice 45 Minutes.	A	*Fillet*	2½	73
		B	*Cima Recta*	7	
		C	*Fillet*	1½	64
		D	*Cima Reverſa*	3	
		E	*Corona*	8	59½
		F	*Caps*	3	55
		G	*Modillions*	7	52
		H	*Plain*	8	37
		I	*Ovolo*	6	
		K	*Fillet*	1	31
		m	*Cavetto*	5	26½
	Frize	L	*Frize*	27	26
	Architrave 36	M	*Fillet*	3	34
		N	*Cima Reverſa*	5	
		O	Third *Facia*	10½	29
		P	*Bead*	1½	
		Q	Second *Facia*	8	27½
		R	*Bead*	1½	
		S	Firſt *Facia*	6½	26
	Capital 31	T	*Abacus* { *Fillet*	1⅔	33¼
		U	*Cima Rev.*	2⅓	
		V	*Volute* { *Fillet*	1⅓	40
		W	*Volute*	5⅓	
		X	*Ovolo*	6⅓	
		Y	*Aſtragal*	5⅓	
		Z	*Fillet*	3⅓	
		d	*Bottom of the Volute*	8	
		ef	*The body above*		26

PLATE VI.

	Principal parts.		Names of the Members.	Heights.	Projections.
The whole Height of the Column 9 Diameters	Baſe 30	XV	*The body below*		30
		A	*Fillet*	1½	2¾
		B	*Bead*	2¼	34¾
		C	*Upper Torus*	5½	37¼
		D	*Fillet*	1¼	33¾
		E	*Scotia*	4½	
		F	*Fillet*	1¼	37
		G	*Lower Torus*	1½	41
		H	*Plinth*	10	41
The whole Height of the Pedeſtal is 2 Diam. 43 Min.	Cornice 21	I	*Fillet*	2	56
		K	*Corona*	6	54½
		L	*Ovolo*	6	47¼
		M	*Bead*	2	4
		N	*Fillet*	1	46
		O	*Cavetto*	4	
	1 Diam. 4 Minutes	P P	*Body or Die of the Pedeſtal*	100	41
	Baſe 42	Q	*Gavetto*	3½	
		R	*Fillet*	1	47
		S	*Bead*	½	48¾
		T	*Cima Reverſa*	6	
		U	*Fillet*	1	55
		V	*Plinth*	28	56

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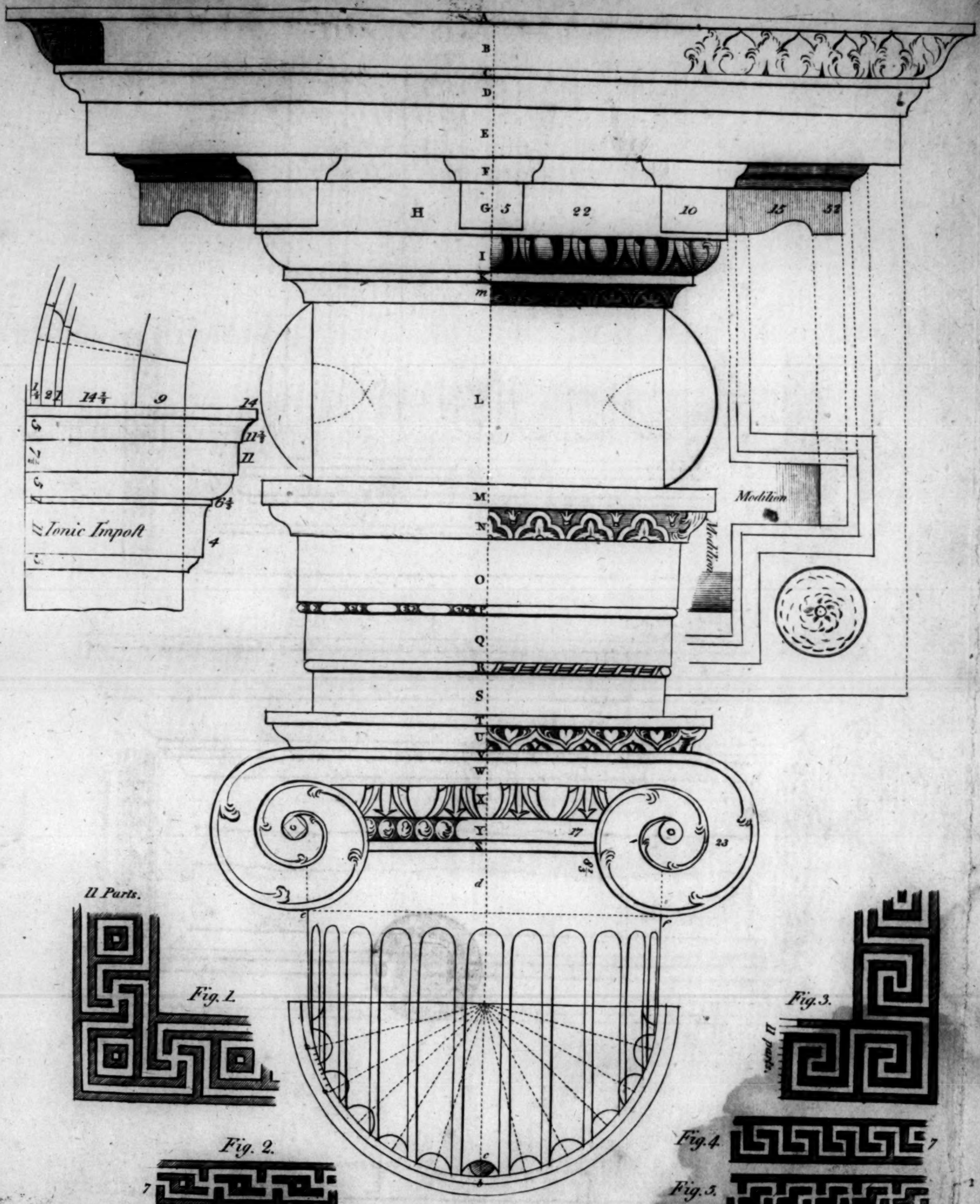
IONIC.


A
B
C
D
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F
G
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5
22
10
15
52
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m
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M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
d
c
b
17
23
Modilion
Modilion
1/4
21
14½
9
24
11¾
11
6¼
4
Ionic Impost
11 Parts.
Fig. 1.
Fig. 2.
7
Fig. 3.
11 parts.
Fig. 4.
7
Fig. 5.

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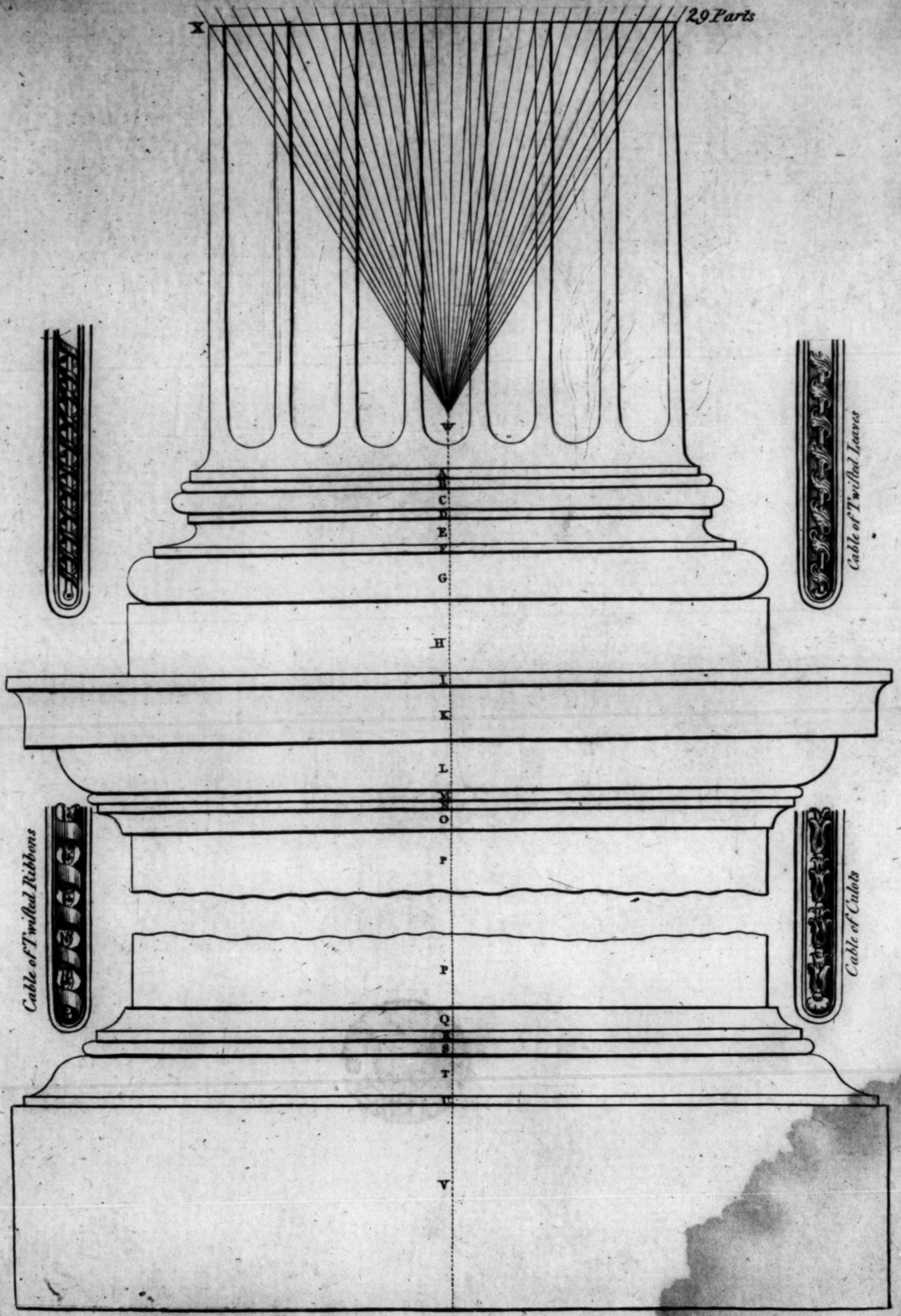
IONIC Base and Pedeſtal. Plate VI.



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CORINTHIAN.

Plate VII.

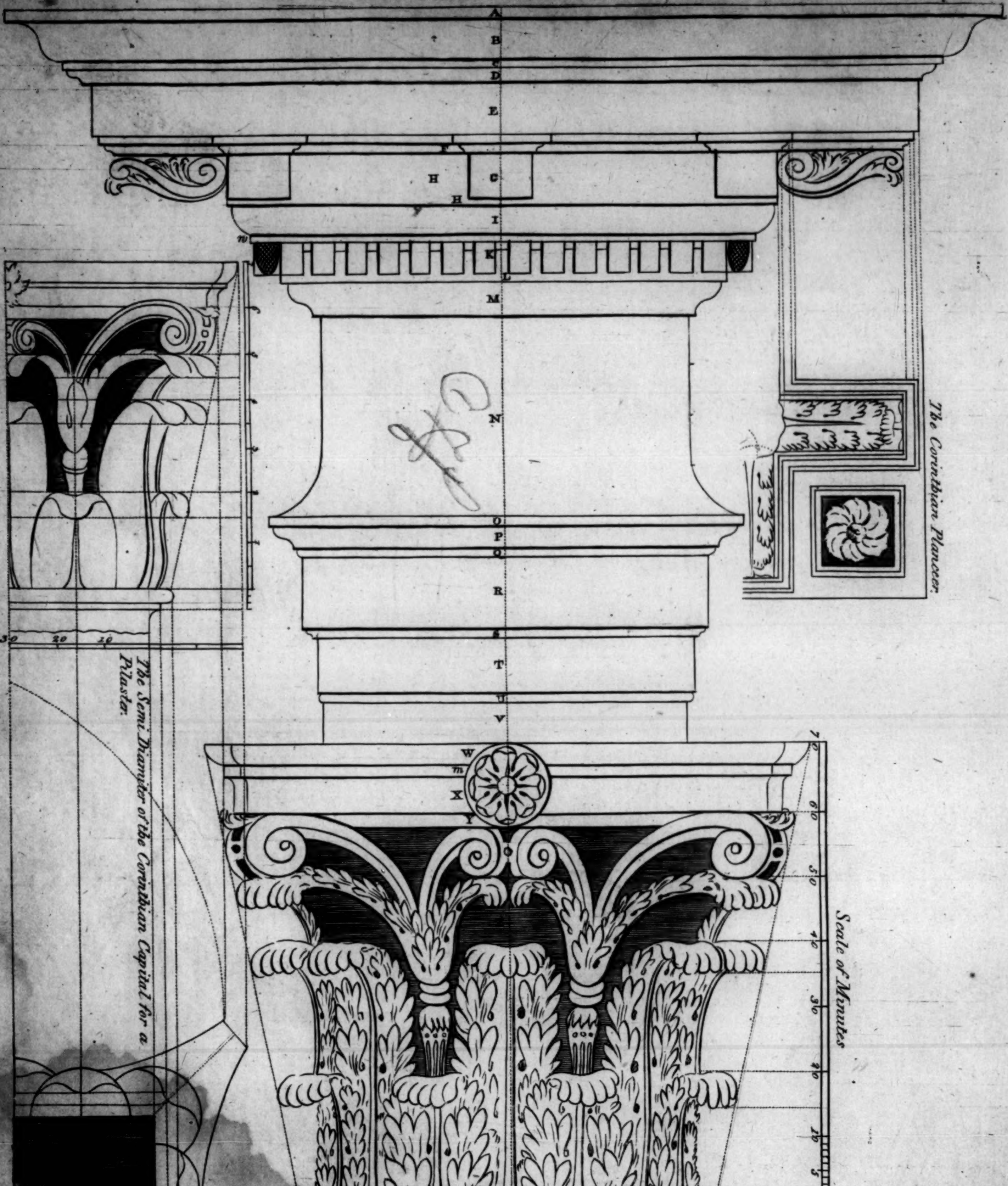

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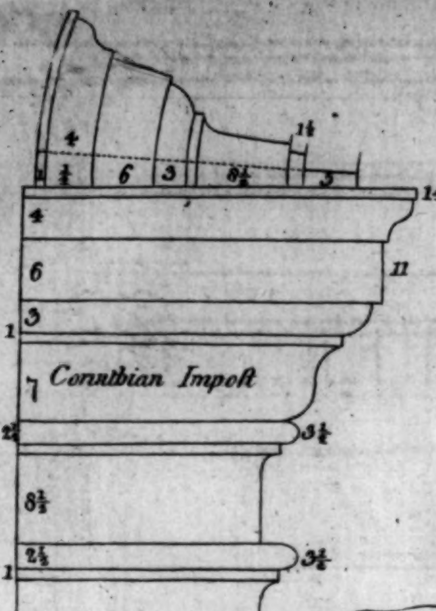
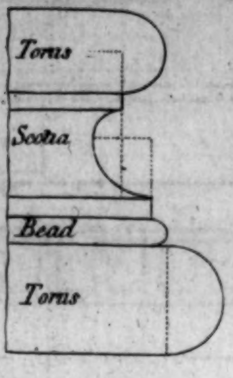
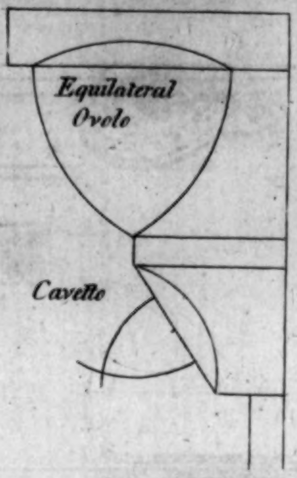
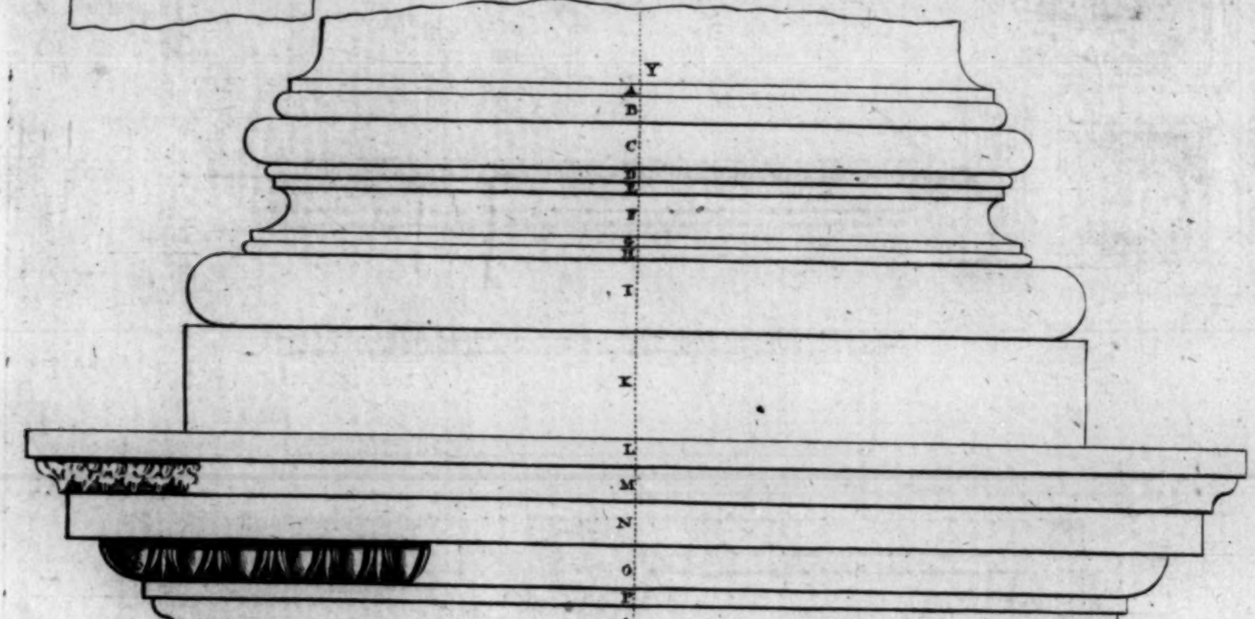
Plate VIII.







CORINTHIAN
Base and Pedestal.



CHAP. IV.

Of the CORINTHIAN ORDER.

THIS *Order* was firſt deſigned by an Architect of *Athens*, and executed at *Corinth*; from whence it is called the *Corinthian Order*.

This column, including baſe and capital, is 9 diameters ½ high, and diminiſhes ⅛ of its diameter; its entablature is ⅕ of the height of the column. The parts, with their heights and projections, are as follow:

PLATE VII.

	Principal parts.		Names of the Members.	Heights.	Projections.
The whole Height of the Entablature 114 minutes.	Cornice 47½ minutes	A	*Fillet*	2½	73
		B	*Cima Recta*	6½	
		C	*Fillet*	1	65¾
		D	*Cima Reverſa*	3	
		E	*Corona*	7	61¾
		F	{ *Fillet*	1	61
			{ *Ogee*	2	60
		G	*Body of the Modil.*	6	40½
		H	*Plain*	1	
		I	*Ovolo*	5	40
		w	*Fillet*	1	35½
		K	*Dentels*	15½	
		L	*Plain*	1	31¼
		M	*Cima Reverſa*	5	
	Frize 28½	N	*Frize*	28½	26¼
	Architrave 28	O	*Fillet*	2½	34¼
		P	*Cima Reverſa*	5	
		Q	*Bead*	2	30¾
		R	Third *Facia*	10½	29¼
		S	*Ogee*	2	
		T	Second *Facia*	8¼	27¼
		U	*Bead Fillet*	1½	
		V	Firſt *Facia*	6½	26¼
	Capital 70	V	*Ovolo* } *Abacus*	3	45
		m	*Fillet* } *Abacus*	1⅓	42
		X	*Corona* } *Abacus*	5⅔	
		Y	*Lift* } *Abacus*	2½	
		Z	*Bell of the Capital*	57½	
	Shaft 7 m. 50 m.	*a*	*Aſtragal*	4	30
		b	*Fillet*	1⅔	
		c	*Body above*		26½

PLATE VIII.

	Principal parts.		Names of the Members.	Heights.	Projections.
The whole Height of the Column, including baſe and capital, is 9 modules 30 minutes.	Shaft 7 m. 50 m.	Y	*Body below*		30
		A	*Fillet*	1¼	33
		B	*Bead*	2½	
	Baſe 30 minutes.	C	*Upper Torus*	4½	37
		D	*Bead*	1¼	
		E	*Fillet*	1	34
		F	*Scotia*	4	
		G	*Fillet*	1	
		H	*Bead*	1¼	37
		I	*Lower Torus*	7	
		K	*Plinth*	10	42
The whole Height of the Pedeſtal is 2 mod. 48 m.	Cornice 9 m.	L	*Fillet*	2½	57
		M	*Cima Reverſa*	3¼	
		N	*Corona*	4¼	53¼
		O	*Ovolo*	4¼	
		P	*Fillet*	1½	46
		Q	*Ogee*	3½	
	Body 1 d. 50 m.	R R	*Body of the Pedeſtal*	110	42
	Baſe 39.	S	*Ogee Reverſa*	4	
		T	*Fillet*	1	47
		U	*Cima Reverſa*	5	
		V	*Fillet*	1	54
		W	*Torus*	4	
		X	*Plinth*	24	57

CHAP. V.

OF THE COMPOSITE ORDER.

THE *Compoſite Order* is ſo called, being compoſed of the *Ionic* and *Corinthian* Orders, and not a complete Order of itſelf; it is of Roman extraction, and by many is called the *Roman*, and by ſome the *Italian Order*. This Order is more ſlender than the *Corinthian* Order, and may be made like it in all its parts, except in the capital.

This column, including baſe and capital, is 10 diameters high; it diminiſhes one eight of its diameter: The entablature is one fifth of the height of the column; the pedeſtal is 3 modules in height. The parts, with their heights and projections, are as follow:

PLATE IX.

	Principal parts.		Names of the Members.	Heights.	Projections.
The whole Height of the Entablature is 2 Diameters.	Cornice 50 m.	A	*Fillet*	2½	½
		B	*Cima Recta*	7	
		C	*Fillet*	1	65½
		D	*Cima Reverſa*	3¾	
		E	*Corona*	9	61
		F	*Ovolo*	2½	54½
		G	*Bead*	1¼	
		H	Firſt *Facia*	6½	49
		I	*Ogee*	1½	
		K	Second *Facia*	5	47½
		r	*Plain*	1	33½
		L	*Cima Reverſa*	5	32½
		M	*Bead*	2	28
		N	*Liſt*	2	27
	Frize 30	O	*Frize*	30	26¼
	Architrave 40 m.	P	*Fillet*	2½	34¾
		Q	*Cymatium*	4¼	33¾
		R	*Ovolo*	4¼	33¼
		S	*Bead*	1½	29½
		T	Second *Facia*	14½	28 2⁄4
		U	*Ogee*	2½	
		Y	Firſt *Facia*	10½	26¼
	Capital 70 m.	W	*Ovolo*	4	45
		X	*Fillet*	1⅓	42
		Y	*Corona*	5⅔	
		a	*Ovolo*	6	
		b	*Aſtragal*	2½	
		c	*Fillet*	1	
		d	*Bell or Baſket of the Capital*	49½	49½
	Shaft 8 d. 20 m.	*f*	*Aſtragal*	⅔	30
		g	*Fillet*	⅔	27½
		h	*Body above*		26¼

PLATE X.

	Principal parts.		Names of the Members.	Heights.	Projections.
The whole Height of the Column, including Baſe and Capital, is 10 Diameters.	Shaft 8 d. 20 m.	*m*	*Body below*	½	30
		A	*Fillet*	½	33½
		B	*Bead*		35
	Baſe 30	C	*Upper Torus*	4½	37
		D	*Fillet*	1	34
		E	*Upper Scotia*	2½	
		F	*Fillet*	½	36
		GH	*Double Aſtragal*	4½	37
		I	*Fillet*	½	36
		K	*Scotia*	2½	
		L	*Fillet*	1	38½
		M	*Lower Torus*	6½	
		N	*Plinth*	8	42
The whole Height of the Pedeſtal 180 Minutes, or 3 Diameters.	Cornice 22	O	*Fillet*	2	57
		P	*Cima Reverſa*	3	
		Q	*Corona*	5	53
		R	*Fillet*	1	
		S	*Cima Recta*	7½	
		T	*Bead*	2¾	45
		U	*Fillet*	1	
	Die or body 113 m.	Y	*Die or Body*	11	42
	Baſe 44	W	*Fillet*	1	45
		X	*Bead*	2½	47
		Y	*Cima Reverſa*	6½	
		Z	*Fillet*	1	54
		a	*Torus*	4	
		b	*Plinth*	30	57

COMPOSITE

Plate.IX.

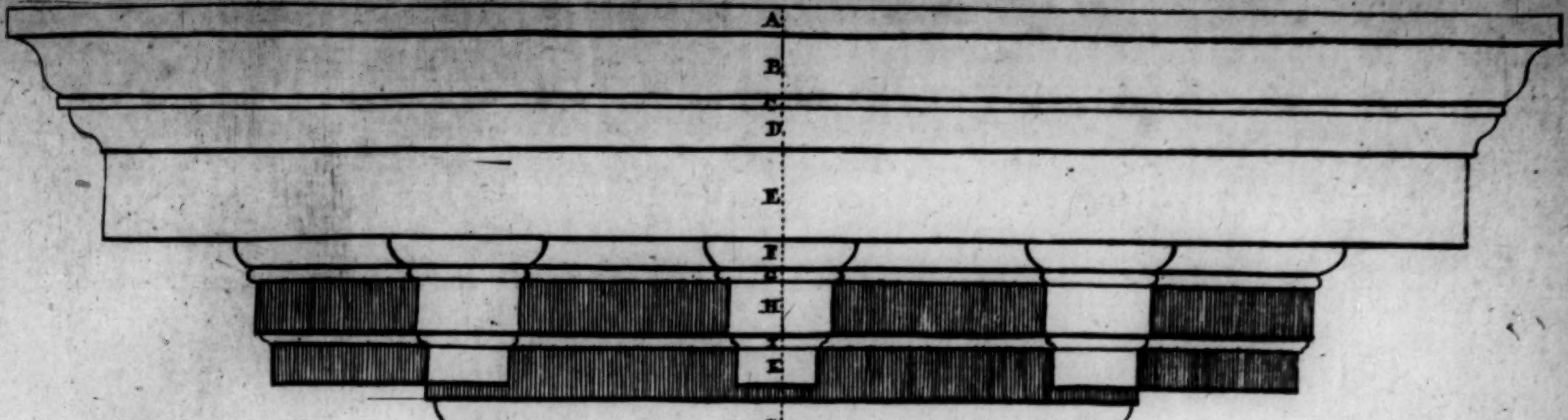


Fig. A.

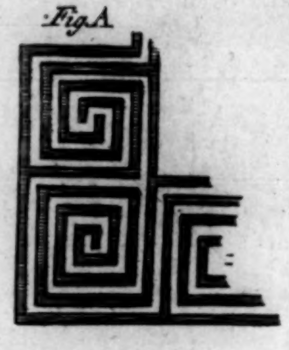
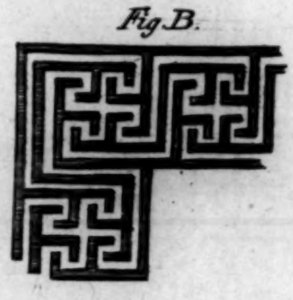


Fig. B.



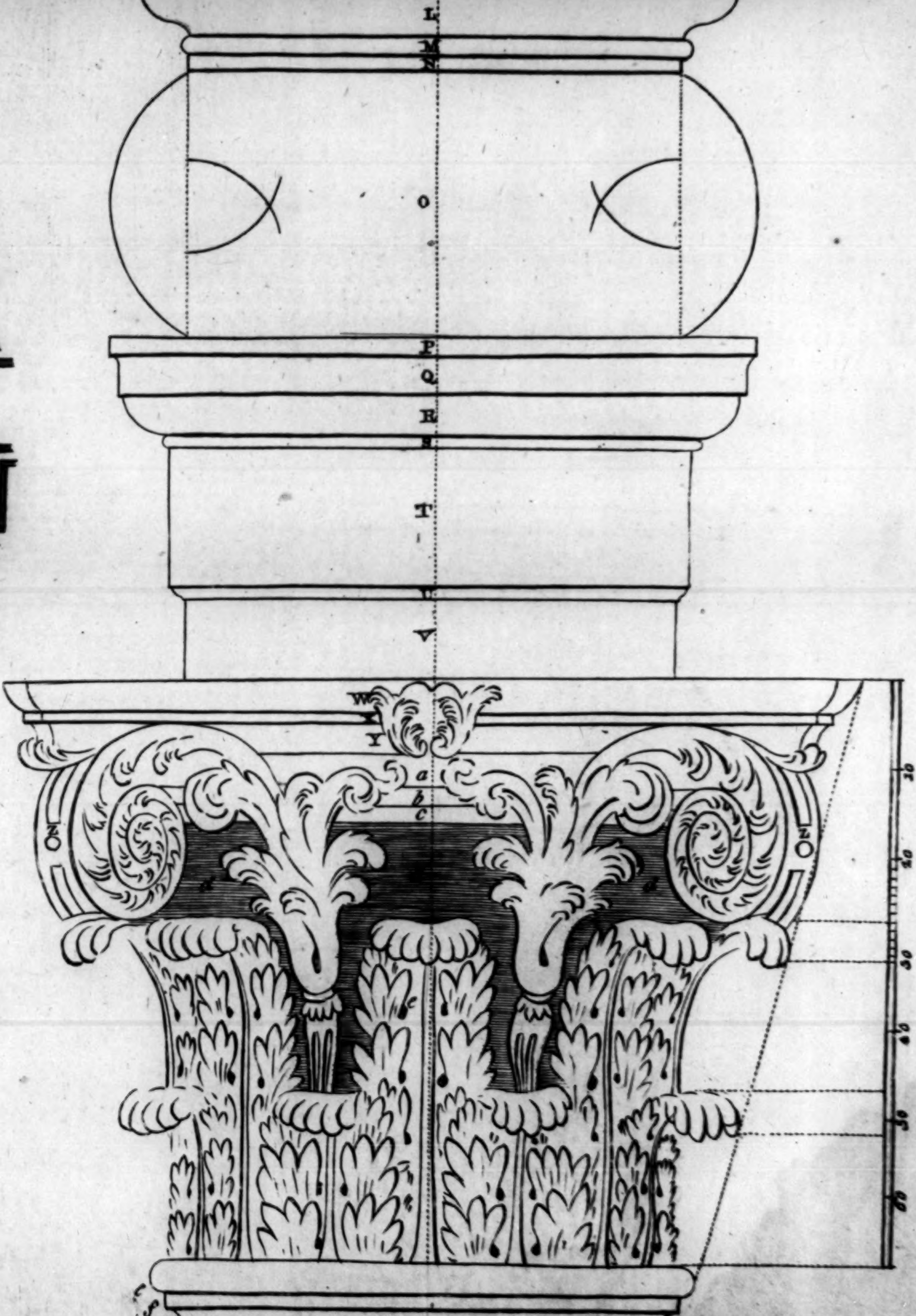


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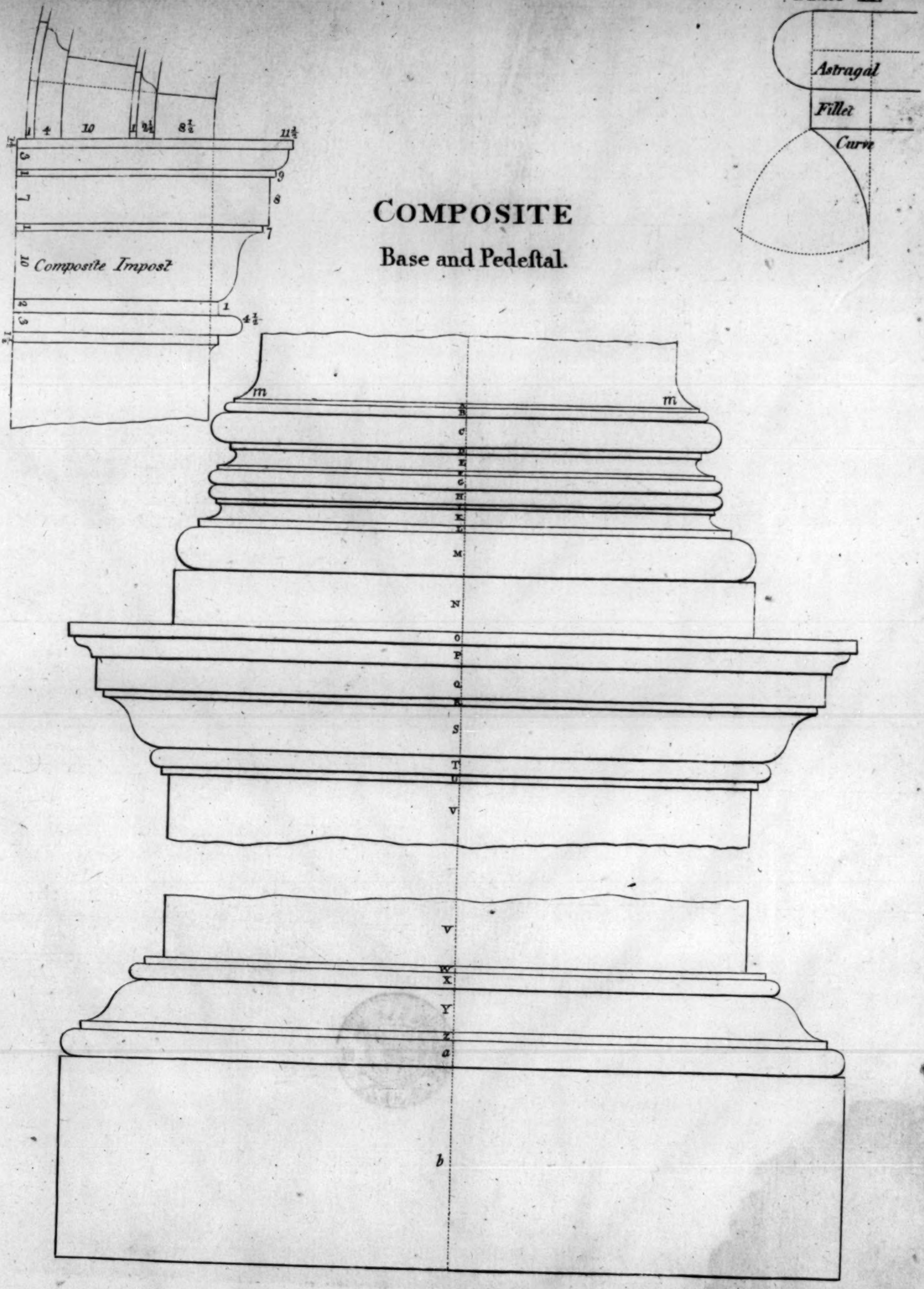
Plate X.

COMPOSITE

Base and Pedeſtal.



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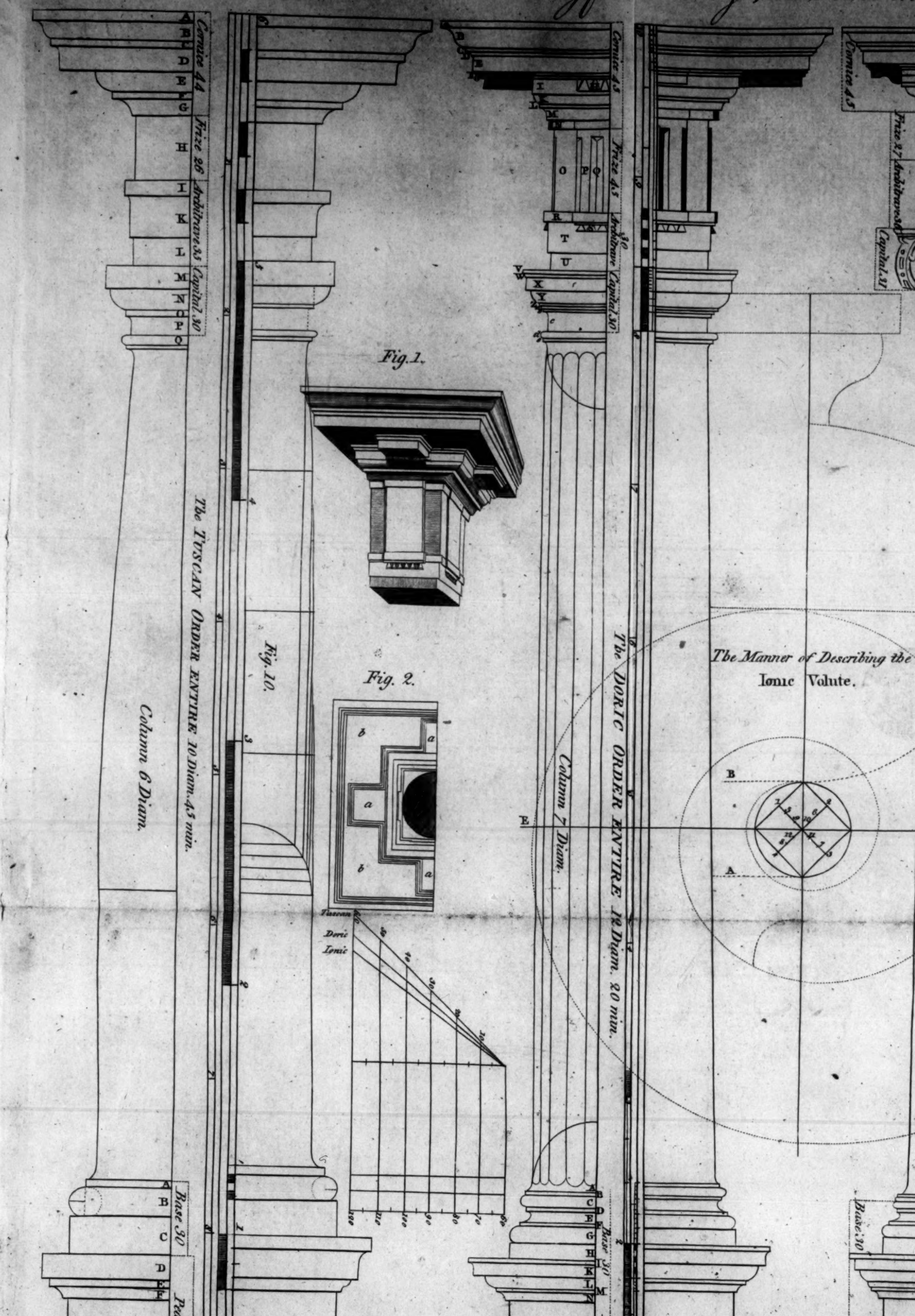
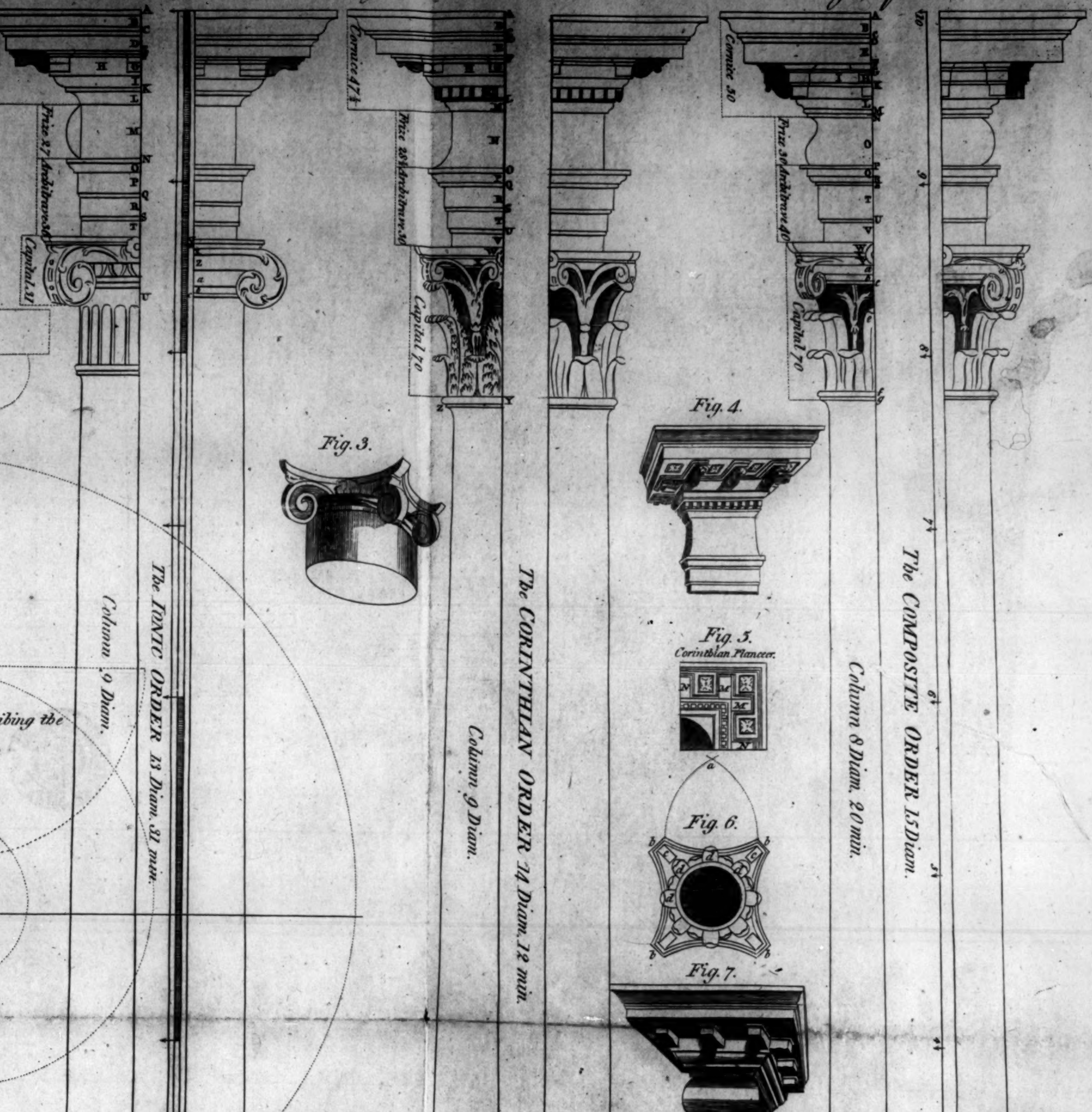
In General Drawn two different ways, the Semi d



FIVE ORDERS

Plate XI.

ni diameter (mark'd ABC &c.) by Modules & Minutes, the other by Equal Parts.



Deſcription of PLATE XI.

Exhibits the five Orders entire. *Fig.* 1. is an oblique ſketch of the Doric entablature. *Fig.* 2. is the planceer of the Doric entablature; *a a a* is the mutules; *b b* the lower part of the corona, often enriched with roſes within ſquare pannels, called *coffers*. *Fig.* 3. is an oblique ſketch of the Ionic capital with the Corinthian abacus. *Fig.* 4. is an oblique ſketch of the Corinthian entablature. *Fig.* 5. is the Corinthian planceer; MM is the returning modillion; NN the central modillions. *Fig.* 6. is the plan of the Corinthian capital; *a a a* the upper tour of leaves; *bbbb* the horns of the abacus; *c c* the ſcrolls. *Fig.* 7. is an oblique ſketch of Ionic entablature. *Fig.* 8. is an oblique ſketch of the ancient Ionic capital. *Fig.* 9. is the plan of the ancient Ionic capital: *a* is the ovolo; *bbbb* the volutes; *cccc* the fillet and *cima reverſa*, or abacus.

The manner of diminiſhing a Tuſcan column, as on Plate XI, you may eaſily underſtand, by carefully inſpecting *fig.* 10.

To deſcribe the IONIC VOLUTE. PLATE XI.

Firſt, draw the aſtragal AB, and through the middle thereof the line EF; then, from the top of the Abacus, let fall, perpendicular to the former, another line paſſing through the centre of the circle, or eye, of the volute, as GH. Within this circle are twelve centres, marked 1, 2, 3, 4, &c. to 12, on which the out-line of the volute is deſcribed, and are thus to be found. Deſcribe a geometrical ſquare; whoſe diagonals are one in the horizontal line, and the other in the perpendicular line, croſſing each other in the centre of the eye; from the middle of the ſides of this ſquare draw two lines which divide the ſquare into four, and each line being divided into ſix parts, gives the twelve centres, or points, required, as they are numbered in the eye of the volute. To deſcribe the volute, open your compaſſes from No. 1. (in the eye of the volute) to the interſection of the perpendicular, and the lower part of the abacus, and draw a quarter of a circle; *viz.* continue it till it meets the horizontal line EF.

Secondly, On the point 2, place your compaſſes, and open them to the arch laſt deſcribed, and continue the arch-line till it meets the perpendicular GH.

Thirdly, On the point 3, place your compaſſes, and open them to the arch laſt deſcribed, and continue the arch-line till it meets the horizontal line EF.

Fourthly, On the point 4, place your compaſſes and open them to the arch laſt deſcribed, and continue the arch-line till it meets the perpendicular GH; and, in like manner, you may turn it about till you have gone through all the twelve centres, which will deſcribe the centre of the volute as required. The inſide line, or border, is deſcribed by a ſecond draught, in the ſame manner as the former, only placing the fixed foot of the compaſſes in twelve other centres, very near the firſt; *viz.* at one fifth part of the diſtance that is between the former, reckoning towards the centre of the eye; and theſe twelve centres are repreſented by the twelve points in the eye of the volute made larger than any other, on which the inſide line may be deſcribed as required.

CHAP. V.

Of the Intercolumniation of the FIVE ORDERS of Columns in Architecture. PLATE XII.

1. *Of the* TUSCAN ORDER. The intercolumniation of this order, that is, the diſtance that the columns ſhould be placed from each

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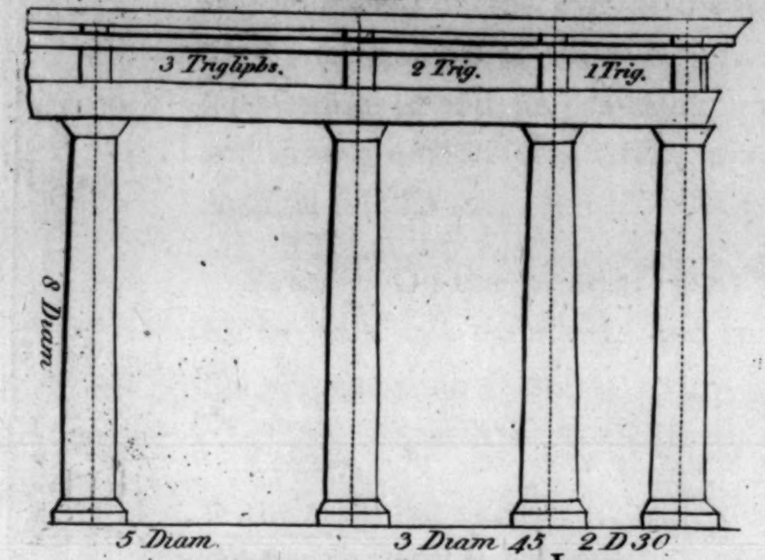
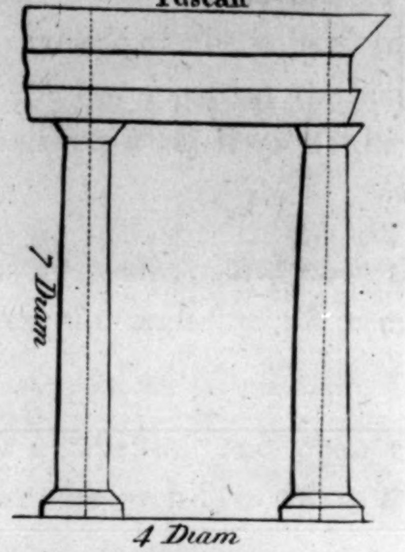
Plate XII

Doric



Tuscan



Ionic

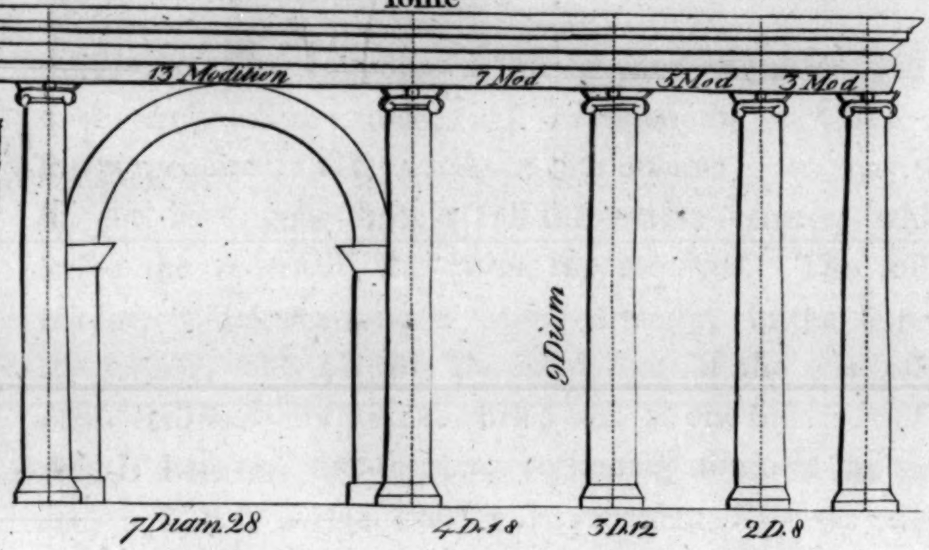
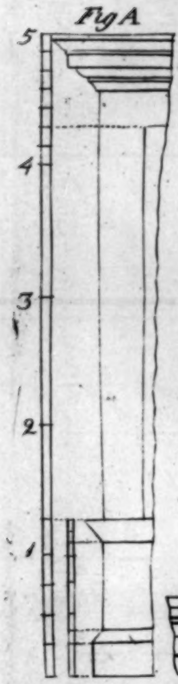
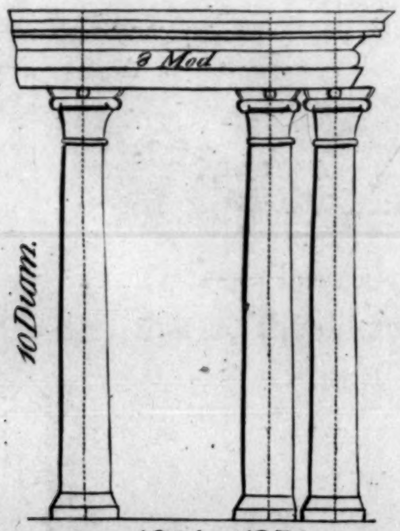


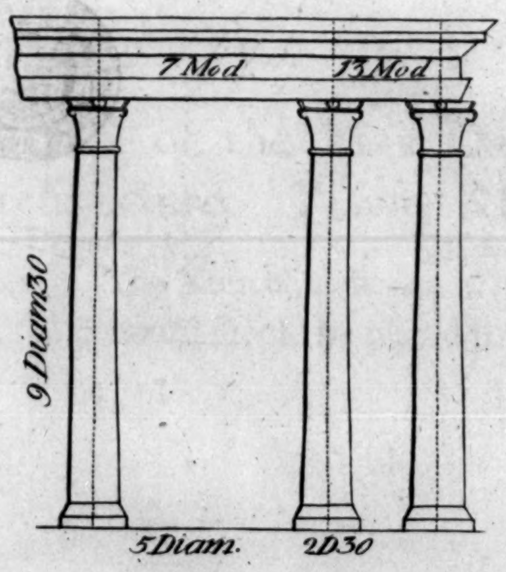
Fig A



Composite



Corinthian



other, is greater in this than in any of the other orders; becauſe its architrave is generally made of wood, and, therefore, hath an intercolumniation of 4 *diameters*, or 4 *diameters* 45 *minutes*. This intercolumniation Vitruvius calls *Arxoſtyles*, which is a compound Greek word, ſignifying columns thin ſet. *Note*, The intercolumniation of columns, is always accounted from the central line of the column. When you are to introduce arches between the columns, the intercolumniation may be 4 diameters and a half, or 5 diameters 15 *minutes:* The aperture, or opening in breadth, muſt be 3 *diameters* 10 *minutes*, and 4 *diameters* in height to the lower part of the impoſt.

2. *Of the* DORIC ORDER. The intercolumniation of this order is always regulated by the number of trigliphs in the frize; *viz.* when 1, 2, 3, 4, or 5 trigliphs are placed between thoſe over the columns, the intercolumniation muſt be, for 1 *trigliph*, 2 *diameters* 30 *minutes;* for 2 *trigliphs*, 3 *diameters* 45 *minutes;* for 3 *trigliphs* 5 *diameters*. Theſe are the ſeveral intercolumniations when the frize is enriched with its trigliphs; but when they are not regarded, the intercolumniation is three diameters preciſely. When the Doric arch is to be made, the intercolumniation muſt be greater than either of the preceding, and muſt contain either 4 or 5 trigliphs between thoſe over the columns; and for ſuch an intercolumniation there muſt be, for 4 *trigliphs*, 6 *diameters* 15 *minutes;* 5 *trigliphs*, 7 *diameters* 30 *minutes*.

3. *Of the* IONIC ORDER. The intercolumniation of this order depends upon the number of modillions between column and column. For, ſince that over every central line of a column there is placed a modillion, as the trigliphs of the Doric order are; it therefore follows, that every intercolumniation will be odd; and when 3, 5, 7, or 9 modillions are placed between thoſe over the column,

the intercolumniation muſt be, for 3 *modillions*, 2 *diameters* 8 *minutes;* 5 *modillions*, 3 *diameters* 12 *minutes;* 7 *modillions*, 4 *diameters* 16 *minutes;* 9 *modillions*, 5 *diameters* 20 *minutes*. Theſe are the various intercolumniations of columns alone; but, when they have arches or doors between the intercolumniation, they may be ſomething larger; viz. 11 *modillions*, 6 *diameters* 24 *minutes;* 13 *modillions*, 7 *diameters* 28 *minutes;* 15 *modillions*, 8 *diameters* 32 *minutes*. *N. B.* That the moſt common intercolumniation is 2 diameters and one fourth; which Vitruvius calls *Euſtileos*, being (as he ſaith, and the word implies) the beſt kind of intercolumniation.

4. *Of the* CORINTHIAN ORDER. The intercolumniation of this order may be the ſame as the Ionic; *viz.* 2 diameters and a quarter; but, if you have regard to the modillions in the cornice, we muſt alſo obſerve, that over the central line of a column there be placed a modillion. It therefore follows that every intercolumniation will be odd; and when 3, 5, 7, or 9 modillions are introduced, the intercolumniation muſt be: for 3 *modillions*, 2 *diameters* 30 *minutes;* 5 *modillions*, 3 *diameters* 45 *minutes;* 7 *modillions*, 5 *diameters;* 9 *modillions*, 6 *diameters* 15 *minutes*. The intercolumniation may yet be greater, where the arch of this order is to come between; as, 11 *modillions*, 7 *diameters* 30 *minutes;* 13 *modillions*, 8 *diameters* 45 *minutes*.

5. *Of the* COMPOSITE ORDER. The intercolumniation of this order is 1 *diameter* 20 *minutes*, when the columns are placed in pairs; but, when ſingle, may be larger, and, when an arch is compriſed between them, may be extended even to 6 or 8 *diameters*. But when the intercolumniation is alſo regulated by the number of modillions contained therein; as firſt, columns placed in pairs, having two modillions between, are (as above) 1 *diameter* 30 *minutes;* but when they conſiſt either of 8, 11, or 16 *modillions*, then the

intercolumniation muſt be, for 8 *modillions*, 4 *diameters* 21 *minutes;* 11 *modillions*, 5 *diameters* 48 *minutes;* 16 *modillions*, 8 *diameters* 13 *minutes*. For the impoſts of arches for this, and all the other orders, ſee upon the margin of the *Plates*, where the orders are delineated at large.

Of PILASTERS.

Pilaſters are a kind of ſquare columns, which appear to be in part ſunk within the wall againſt which they ſtand; and that part of them which appears before the face of the wall, is called their *projecture;* which projections are to be conſidered with reſpect to the order they are of: As, *firſt*, the Tuſcan and Doric need be no more that $\frac{1}{5}$ or ' of their diameters; excepting when they are to receive impoſts againſt them, and then they muſt project $\frac{1}{4}$ of their diameter. The projection of the impoſts muſt not project more than the pilaſters. *Secondly*, Pilaſters of the Ionic, Corinthian, and Compoſite Orders, ſhould have a projection equal to half their diameters, that the returns of their capitals may terminate exactly in the middle, whereby they have the moſt graceful effect. When they have leſs projection than half their breadth, and flutings are required thereon, then the ſaid projection is to be limited by the number of flutes; let them be 1, 2, or three, which muſt be made equal to thoſe on the face or front of the pilaſters. *Note*, A pilaſter hath its baſe, capital, and entablature, as the column in every reſpect; but doth not diminiſh upward as a column doth.

CHAP. VII.

HOW, by arithmetical calculation, to find the module or exact diameter, in proportion to any limited height of columns or pilaſters, according to any of the five orders in architecture; and in all the various caſes that can poſſibly occur in practice, by the proportions exhibited in the following table; which are deducible from the meaſures laid down in page 2, 5, 6, 7, and 8. Alſo, to calculate a module according to the proportions laid down by any other Author, upon what order ſoever. Likewiſe by ſcale and compaſs.

		Mod.	M.		F.	I.	
The *Tuſcan.*	Column alone - - -	7	00	or	7	0	in height.
	Column and Entablature	8	45		8	9	
	Column Ped. and Entab.	10	45		10	9	
	Column and Pedeſtal only	9	00		9	0	
The *Doric.*	Column alone - - -	8	00	or	8	0	in height.
	Column and Entablature	10	00		10	0	
	Column Ped. and Entab.	12	20		12	4	
	Column and Ped. only	10	20		10	4	
The *Ionic.*	Column alone - - -	9	00	or	9	0	in height.
	Column and Entablature	10	48		10	$9\frac{5}{8}$	
	Column Ped. and Entab.	13	31		13	$6\frac{1}{5}$	
	Column and Ped. only	11	43		11	$8\frac{5}{9}$	
The *Corinthian.*	Column alone - - -	9	30	or	9	6	in height.
	Column and Entablature	11	24		11	$4\frac{1}{3}$	
	Column Ped. and Entab.	14	12		14	$2\frac{1}{8}$	
	Column and Ped only	12	18		12	$3\frac{5}{5}$	
The *Compoſite.*	Column alone - - -	10	00	or	10	0	in height.
	Column and Entablature	12	00		12	0	
	Column Ped. and Entab.	15	00		15	0	
	Column and Ped. only	13	00		13	0	

The uſe of the table, in finding the exact module, or diameter, in proportion to any height of columns or pilaſters.

EXAMP. Soppoſe you want to know the module, or diameter, for erecting the Doric column and entablature, to a limited height of 15 feet 3 inches.

Seek in the table, the Doric column and entablature, and right againſt it you will find 10 modules, or 10 foot in height; which is equal to 10 modules, accompting every module to contain one foot.

Now, to find a module in proportion to the height propoſed; viz. 15 feet 3 inches, ſay, by the *Rule of three direct*, If 10 foot (*Note*, you may always reject the fractional part of an inch in the height, if any) in height require a module of 12 inches, What will 15 feet 3 inches require?

Now, as the firſt and third numbers do each conſiſt of two denominations, viz. feet and inches, you muſt therefore always obſerve, firſt, to reduce each number into the loweſt denomination, that is, inches: and obſerve alſo, that the firſt and third numbers are both of one denomination; that is, both feet, or both inches. Which is done by multiplying the feet by 12, and add in the inches as followeth:

```
     Feet. Inch. Feet. Inch.              Inch. Inch. Inch.
  If 10——12——15  3.                  If 120——12——183
     12          12                                12
     ——          ——                                ———
     20          33                                366
     10          15                                183
     ——          ——                                ———
1ſt, No.  120 Inch 183 3d. No. in Inches      120)2196(18 inch.
                                                  120
                                                  ———
                                                  996
                                                  960
                                                  ———
                                                   36 Rem.
Note, You muſt always multiply the re-             16 Multip.
  mainder by 16, and divide as before;            ———
  and the quotient will be ſo many 16ths          216
  of an inch, as you ſee in this Example.          36
                                                  ———
                                              120)576(4
                                                  480
                                                  ———
                                                   96
```

From the foregoing operation it appears, that to erect a Doric column with its entablature, to a limited height of 15 foot 3 inches, it will require a module or diameter, of 18 inches and $\frac{4}{16}$ of an inch in proportion thereunto.

The ſame rule is to be obſerved in finding a module to any of the other orders, in any of the caſes, or to any height whatſoever.

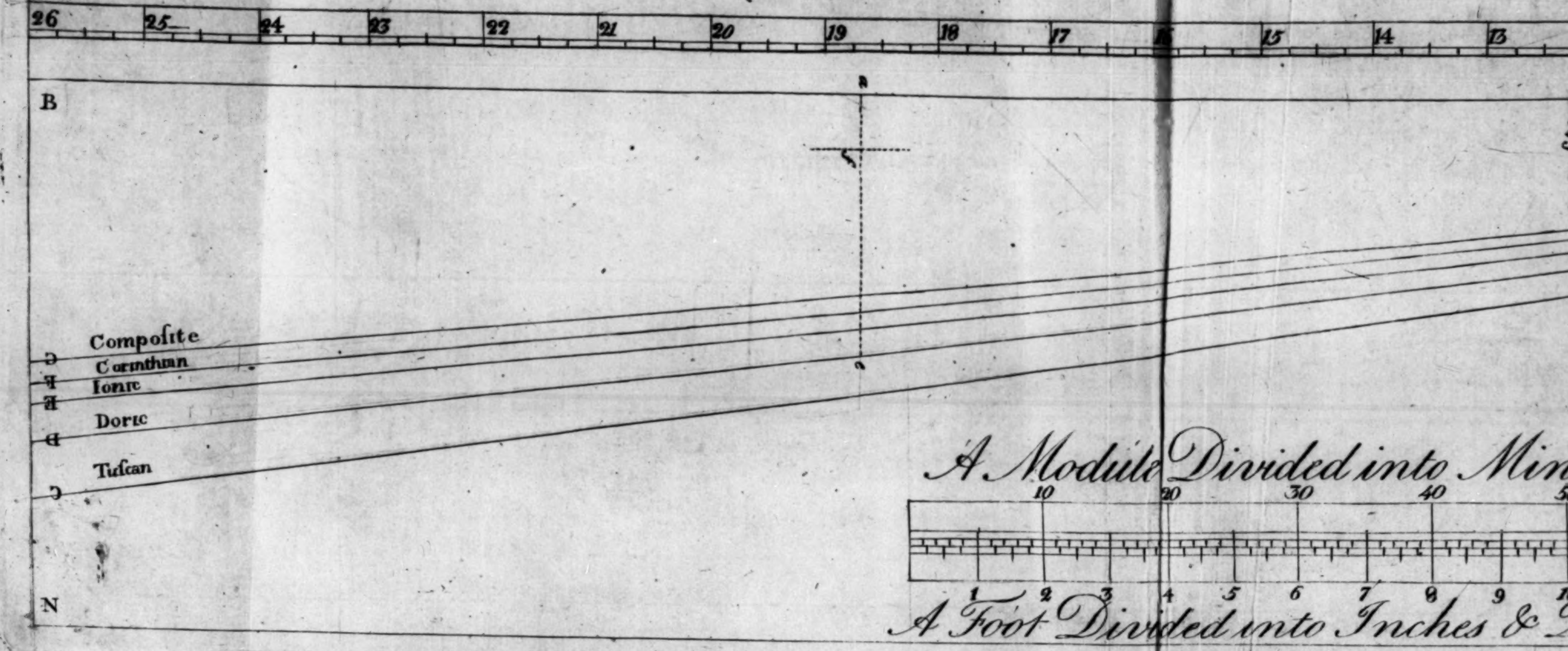
Note, Always obſerve to make uſe of the feet and inches ſet down in the table againſt the caſe you require the module to be calculated to, for the firſt number in the operation: and 12 inches for the ſecond; becauſe 12 inches is a proportionable module to thoſe heights in the table: And the third number muſt be the height that you require a module in proportion to.

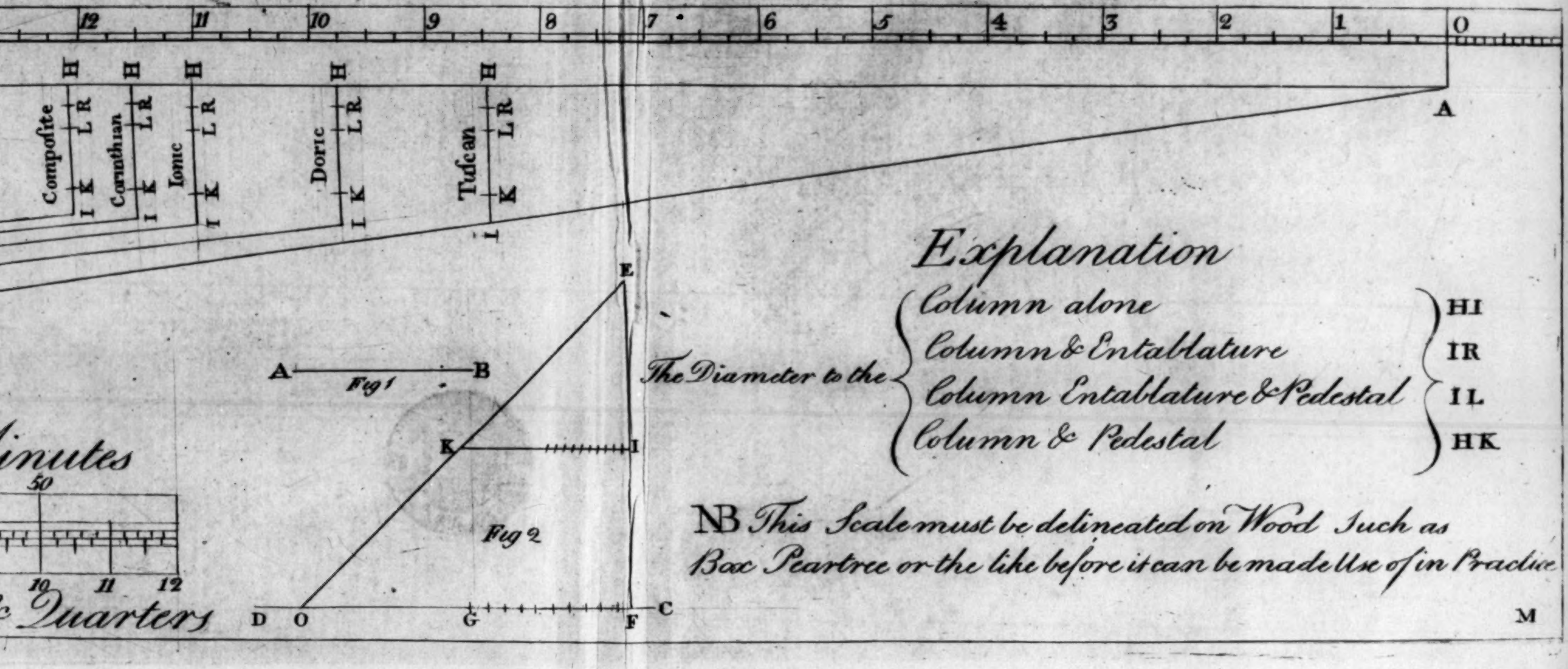
To calculate a Module according to the Proportions laid down by any Author, and upon what Order ſoever.

To calculate a module, in true proportion, according to any other Author, you muſt firſt make a module, or ſcale, divided into 60 equal parts called *minutes;* and the ſame length again divide, right under the former, into 12 equal parts, which you muſt call *inches;* and each of thoſe inches you muſt again ſub-divide into four equal parts, to repreſent quarters of inches: *See Plate* XIV. This ſcale ſo divided will ſhew by inſpection, how many inches are contained in any number of minutes, which is to be made uſe of in the following manner.

Examp. Suppoſe you would find a module for erecting a Doric column with its pedeſtal, and entablature: according to the meaſures laid down by Perrault, which contains 12 modules 19 minutes, you muſt account the 12 modules 12 foot, and the 19 mi-

PLATE XIII


B
Composite
Corinthian
Ionic
Doric
Tuscan
A Module Divided into Min
A Foot Divided into Inches &
N



Explanation

The Diameter to the	Column alone	HI
	Column & Entablature	IR
	Column Entablature & Pedestal	IL
	Column & Pedestal	HK

NB This Scale must be delineated on Wood such as Box Peartree or the like before it can be made Use of in Practice nutes you muſt look for in the ſcale above mentioned in Plate XIV. and you will find, that 19 minutes contains 3 inches and ¾, which makes the whole height to contain 12 foot 3 inches ¾: Rejecting the ¾, ſay, If 12 foot 3 inches in height require a module of 12 inches, what will any other height require? The ſame of any other Author, in any of the caſes before mentioned, upon any order.

CHAP. VIII.

A Deſcription and Uſe of an Inſpectional Plane-ſcale, for finding the exact Diameter, in Proportion to any limited Height of Columns and Pilaſters. PLATE XIII.

IN the upper part there is a ſcale of 26 feet, and, at the beginning thereof, one of thoſe feet, or diſtances, are divided into 12 equal parts called *inches*. The 26 feet are each divided into 4 equal parts; and every one of thoſe diviſions repreſent quarters of feet.

The ſcale for finding the diameter to any limited height, is the angles ABC, ABD, ABE, ABF, and ABG.

The perpendiculars, that croſs the angles, ſhew which out-lines repreſent the Tuſcan, Doric, Ionic, Corinthian, and Compoſite Orders; and the Diviſions, on thoſe perpendiculars, marked RLK, ſhew how to find the diameter for erecting a column alone; the column and its entablature; the column, entablature, and pedeſtal; or the column and pedeſtal only: and which of thoſe diviſions repreſents each of theſe in particular, is ſufficiently explained in the Plate.

EXAMP. I. Suppoſe you would know the diameter for erecting the Doric column, with its entablature, to a limited height of 18 foot 7 inches and $\frac{1}{2}$.

Apply a ſquare to one ſide of the ſcale, as ſuppoſe the ſide MN; move the ſquare backward and forward until the ſide thereof is right over 18 foot 7 inches and $\frac{1}{2}$; then, from the line AB to the line ID, (which is the line for the Doric Order,) draw the line *a e*. Secondly, take a ruler, and lay from the point A, over the firſt diviſion on the Doric perpendicular line, as at R, and make a mark by the ſide of the ruler, juſt over the perpendicular *a e*, as at *f*. Then is *e f* a proportional diameter to the limited height as required. If you take the diſtance *e f* between your compaſſes, and apply them to the beginning of the upper ſcale of feet and inches, it will ſhew you the diameter in feet and inches, which, in this example, is 1 foot 10 inches and $\frac{1}{3}$.

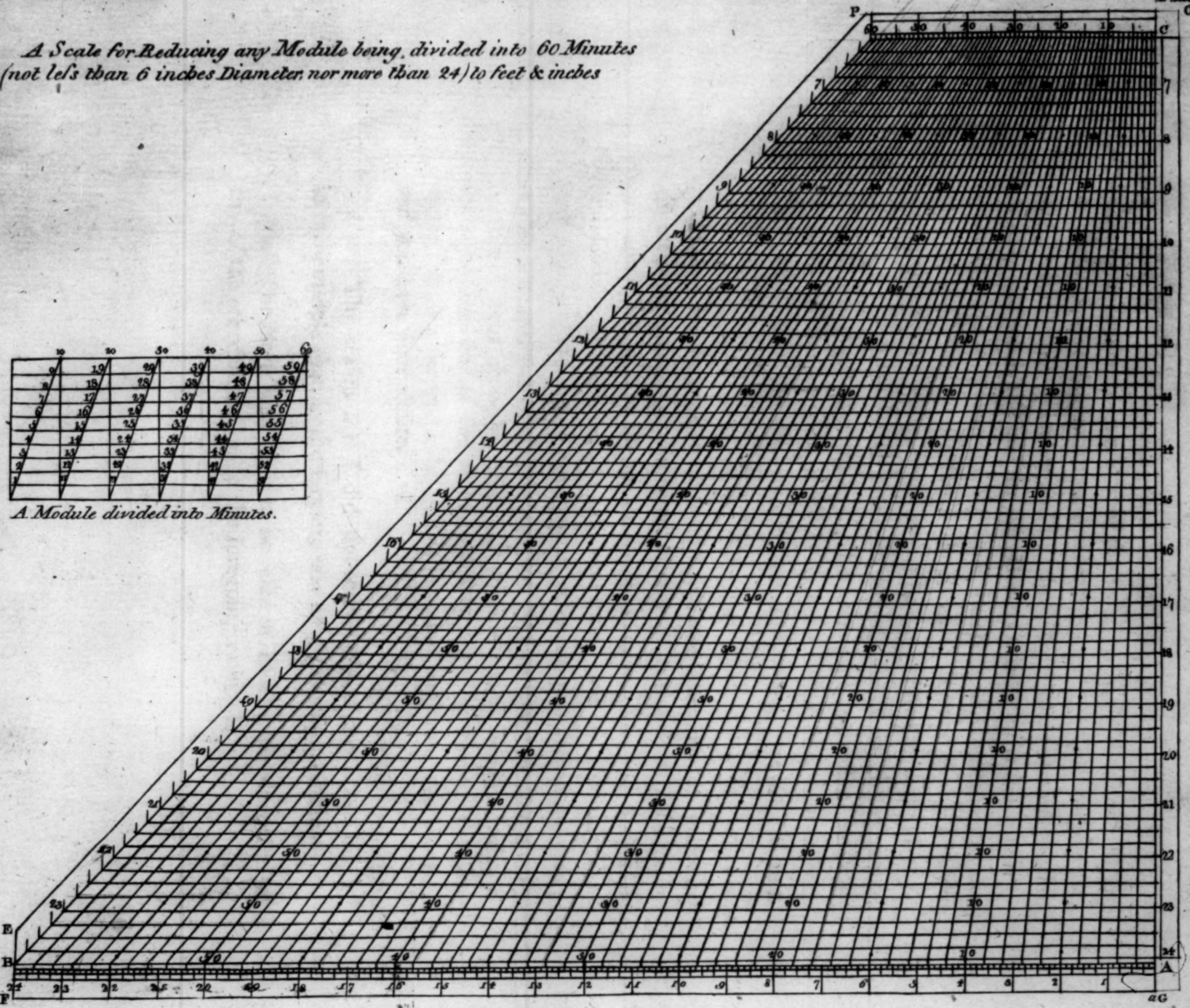
EXAMP. II. Suppoſe you would find the diameter for delineating on paper, &c. a column or pilaſter to any height your paper will admit of, not at all regarding how many feet and inches is repreſented. In ſuch a caſe, take the ſcale, and lay that ſide that hath the feet and inches to the paper whereon you intend to draw, laying the perpendicular AQ exactly over where you intend the bottom of your draught, and, at your intended height, make a mark on the ſide of the ſcale, as at *o*; then for finding the diameter, draw a perpendicular (as before directed) from the point *o*, and you have your deſire.

Note, The reaſon that I did not make uſe of any other height in this example than in the former, was only to avoid confuſion.

Note, The ſame method is to be uſed in finding the diameter to any of the other orders, as in the foregoing examples.

Plate XIV.

A Scale for Reducing any Module being, divided into 60 Minutes (not less than 6 inches Diameter, nor more than 24) to feet & inches



A Module divided into Minutes.

Of making divers Scales, &c. PLATE XIII.

How to divide a given line into any number of feet and inches.

Let it be required to divide the line AB, *fig.* 1. into 1 foot 10 inches.

OPERATION. Draw a right line at pleaſure, as CD, and with any ſmall opening of the compaſſes, ſet thereon 12 equal parts, as from C to G; take between your compaſſes thoſe 12 diviſions CG, and ſet it on from G to O; erect the perpendicular FE on the 10th diviſion from G, and equal in length to FO, and draw the diagonal line EO: take between your compaſſes the length of the given line AB, and ſetting one foot of the compaſſes on the point E, with the other make a mark on the perpendicular EF, as at I, draw the line IK parallel to the line CD, and it will be equal in length to the given line AB; and if you lay a ruler from the point E, and over each of the ten diviſions from G to F, and making a mark by the ſide of the rule, croſs the line IK, for each diviſion, it will divide the given line into 1 foot 10 inches, as required. And the like of any other.

CHAP. IX.

A Deſcription of an Inſpectional Plane-ſcale, for reducing Modules and Minutes to Feet and Inches. PLATE XIV.

THE beſt way to make uſe of this ſcale, is to delineate it upon wood, or to paſte it on a piece of thin board plained very ſmooth, and then ſquared, and cut to the exact form and bigneſs of the out-lines thereof, as FGOPE. When you paſte it on the board, be careful there be no rumple, and that you do not pull the lines out of a ſtraight, and that the lower edge of the board FG be exactly ſquare with the perpendicular line AC. Next you muſt have a tee-ſquare, ſuch a one as is uſed with a draught-board; let the blade be in length equal to the height GO, and as thin as it can be well made.

EXPLANATION. The lower ſcale AB is a ſcale of 2 feet, or 24 inches, divided into half inches, quarters, and half quarters; in the ſame manner as the common 2 foot rule; and is the ſcale by which the modules are reduced to feet and inches. The other ſcales marked on the ſides with 6, 7, 8, 9, &c. to 24, are ſo many modules divided into 60 equal parts or minutes, and are equal to 6, 7, and 8 inches, &c of the lower ſcale AB: The ſcales between thoſe, marked with 6, 7, &c. repreſent modules of 6¼ inches, 6½, 6¾; and the ſame is to be underſtood of any of the other ſcales between 7 and 8, 9 and 10, &c.

PRACTICE. Suppoſe the module to be reduced to inches, be 12 inches, and it be required to know how many inches there are in 45 minutes. Firſt, ſeek for the module of 12 inches in the ſide AC, lay the ſquare to the ſide GF, and ſlide the ſquare about until the ſide of the blade lies right upon 45 minutes of the 12 inch module, and caſt your eye from thence to the lower ſcale AB; and the ſame edge of the ſquare that lies over 45 minutes of the 12 inch module, will ſhew you how many inches are contained therein, which in this example is 9 inches.

Again. Slide the ſquare to 15 minutes, and you will find it is 3 inches. The ſame rule is to be obſerved in reducing any other module; and therefore needs no more Examples.

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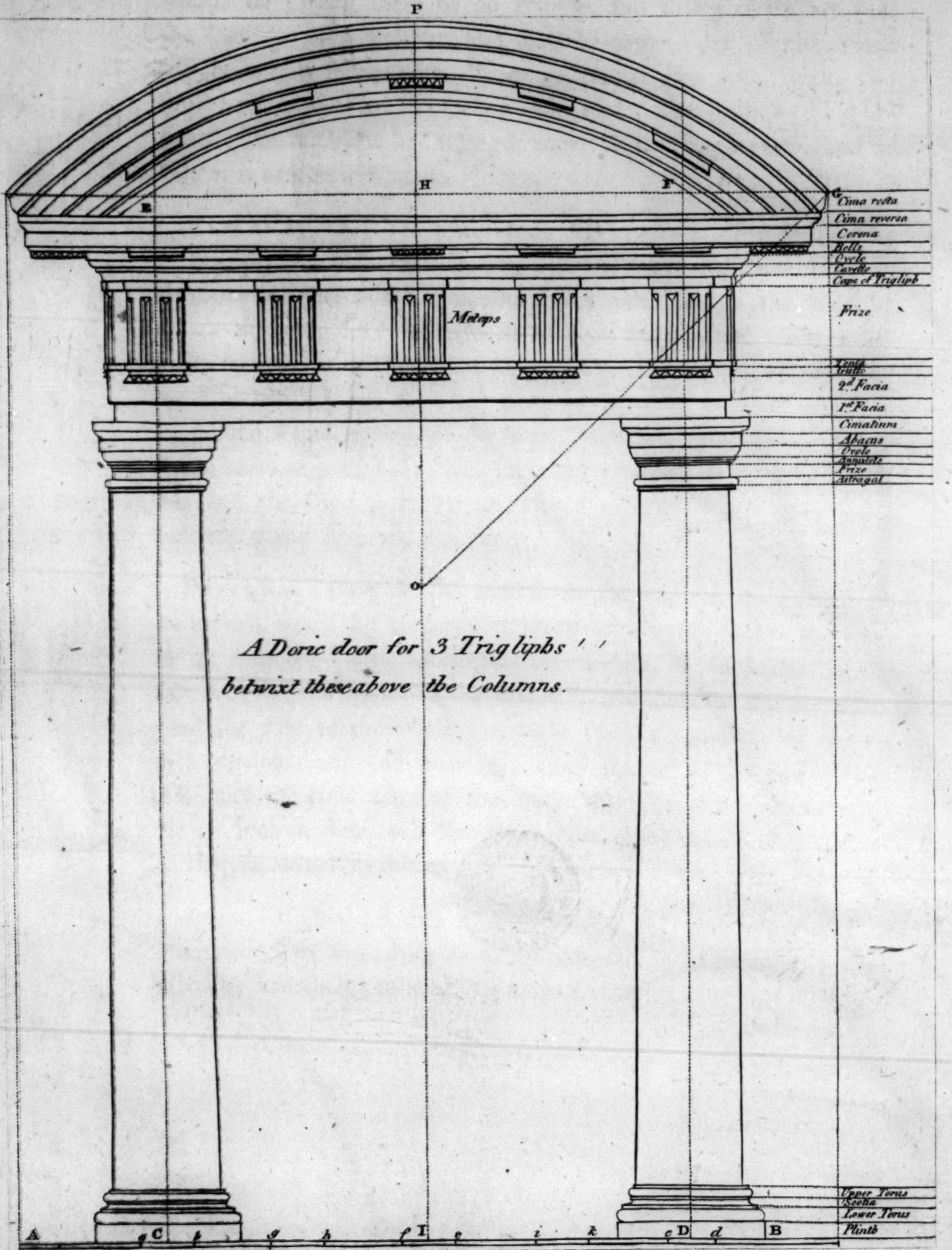

A Doric door for 3 Triglipbs
betwixt these above the Columns.

Now, ſince there is ſome trouble in making the tee-ſquare, I ſhall give you one Example how to perform the ſame with only a pair of compaſſes or dividers.

Examp. Let it be required to reduce a module of 16 inches to inches, and to know the height of the frize in the Doric Order in inches; which is 45 minutes in height. *Practice.* Seek for the module of 16 inches, and placing one foot of the compaſſes on the line *a e*, extend the other to 45 minutes; and that extent applied to the lower ſcale AB, will ſhew that 45 minutes, the height of the frize, is equal to 12 inches, as was required.

How to draw a Frontiſpiece according to any of the Five Orders.

Plate XVI.

Examp. Suppoſe the frontiſpiece to be drawn by the Doric Order, with a compaſs pediment.

1. Draw the baſe line AB, and erect the perpendicular line IH at pleaſure, and ſet thereon the height you intend the firſt and uppermoſt member ſhall be of, as ſuppoſe H, and find the diameter to the height IH, as is taught, *Chap.* VIII.

2. Conſider how many trigliphs you would have placed between thoſe over the columns, which in this example are three; then ſeek, by *Chap.* VI. what muſt be the intercolumniation for 3 trigliphs between thoſe placed over the columns, and you will find the intercolumniation to be 5 diameters; that is, the diſtance from the central line CE, to the central line DF.

3. The intercolumniation being found, take half thereof between your compaſſes, and ſetting one foot in the point I, make

a point both ways upon the line AB; at C and D, erect the perpendicular lines CE and DF, for the central lines of the columns.

4. Upon the baſe line AB, ſpace out the trigliphs thus; take 15 minutes, the half breadth of one of the trigliphs between your compaſſes, and prick it on both ſides of the point C, as *a b*, and on both ſides of the point I, as *e f*, and on the point D, the two points *c d*: Take 45 minutes, the height of the frize (which is the breadth of the metops) between your compaſſes, and place it from *f* to *h*, and from *e* to *i*; and from *g* to *h* is the breadth of a trigliph, ſo is alſo the breadth *i k*. So have you the baſe line divided for the more ready delineating the ornaments in the frize.

5. Upon the central line of the column CE, from the point E, prick on the height of every member, and when you begin to draw the lines, omit the firſt two lines that make the ſquare of the *cima recta;* that is, omit drawing them with ink, and only draw them with the point of the compaſſes, or pencil, that they may not be diſcovered when your draught is finiſhed; and as to all the other lines, you may proceed in drawing of them as was directed in the foregoing chapter, for theſe two upper lines are omitted, becauſe of the cornice in the pediment mitering to the level returned cornice.

To find the Pitch of the Pediment.

Set one foot of the compaſſes in H, extend the other to G; the compaſſes ſtill reſting in H, turn them round to the interſecting point *o*, for the centre of the pediment required.

Note, It is the ſame rule to find the centre for a raking pediment, as for a compaſs one, as may be ſeen by the dotted line PG.

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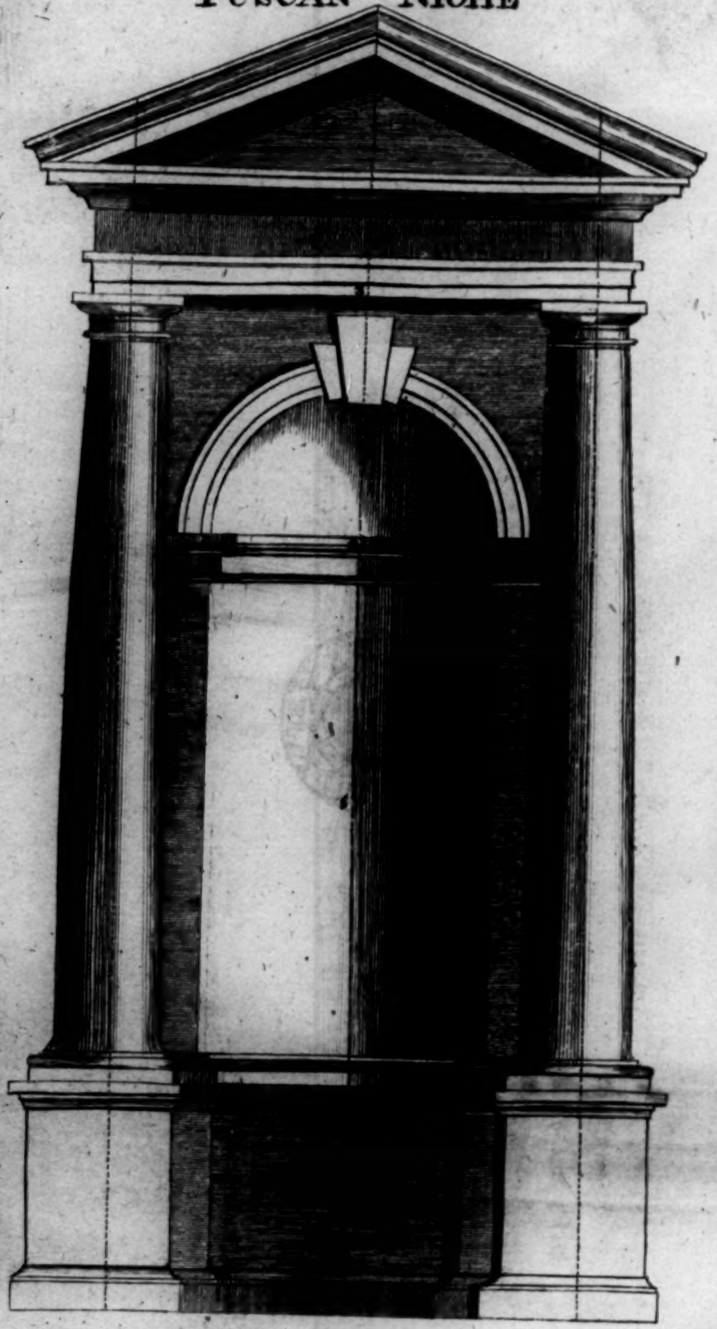
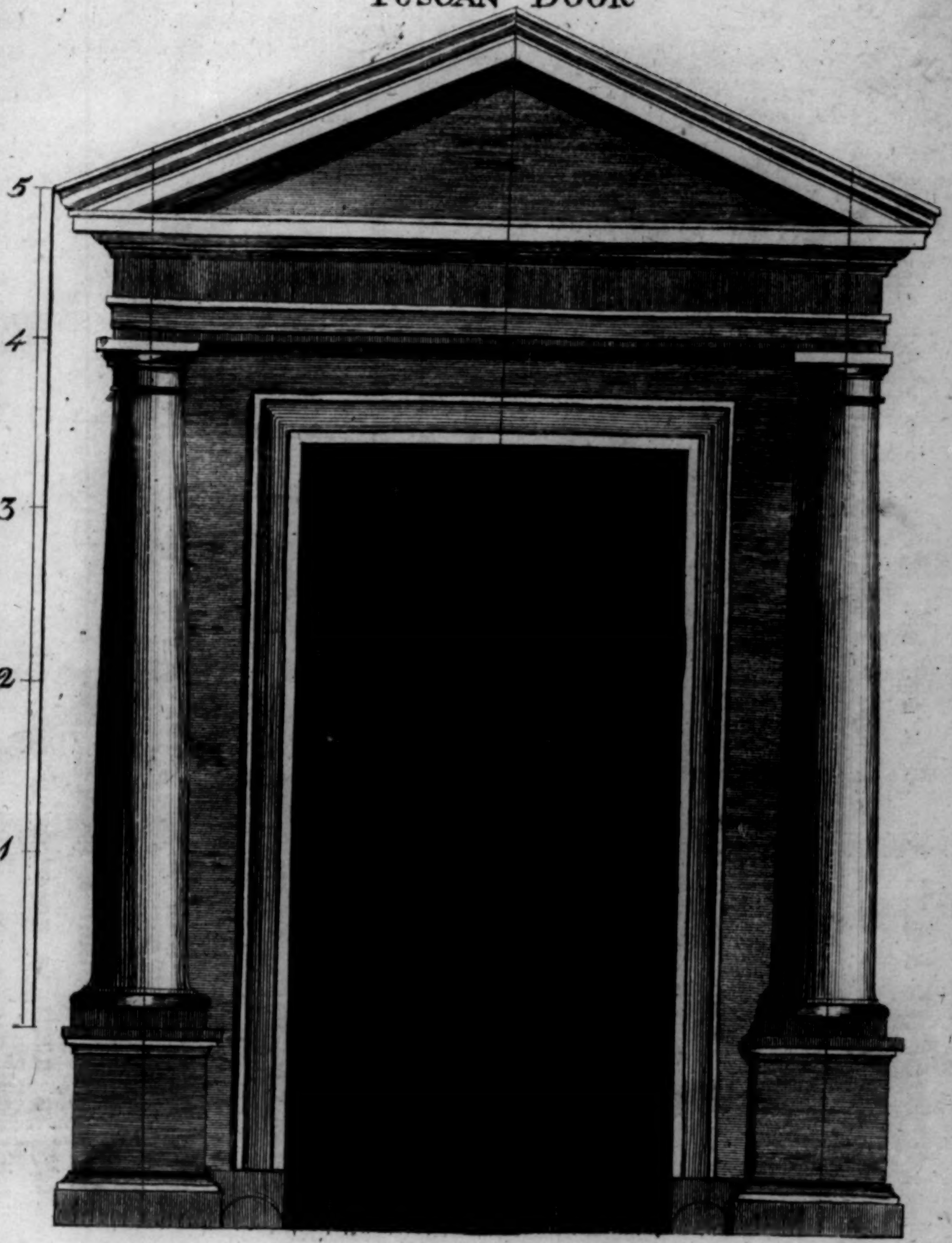
Plate XVI

TUSCAN NICHE



TUSCAN DOOR



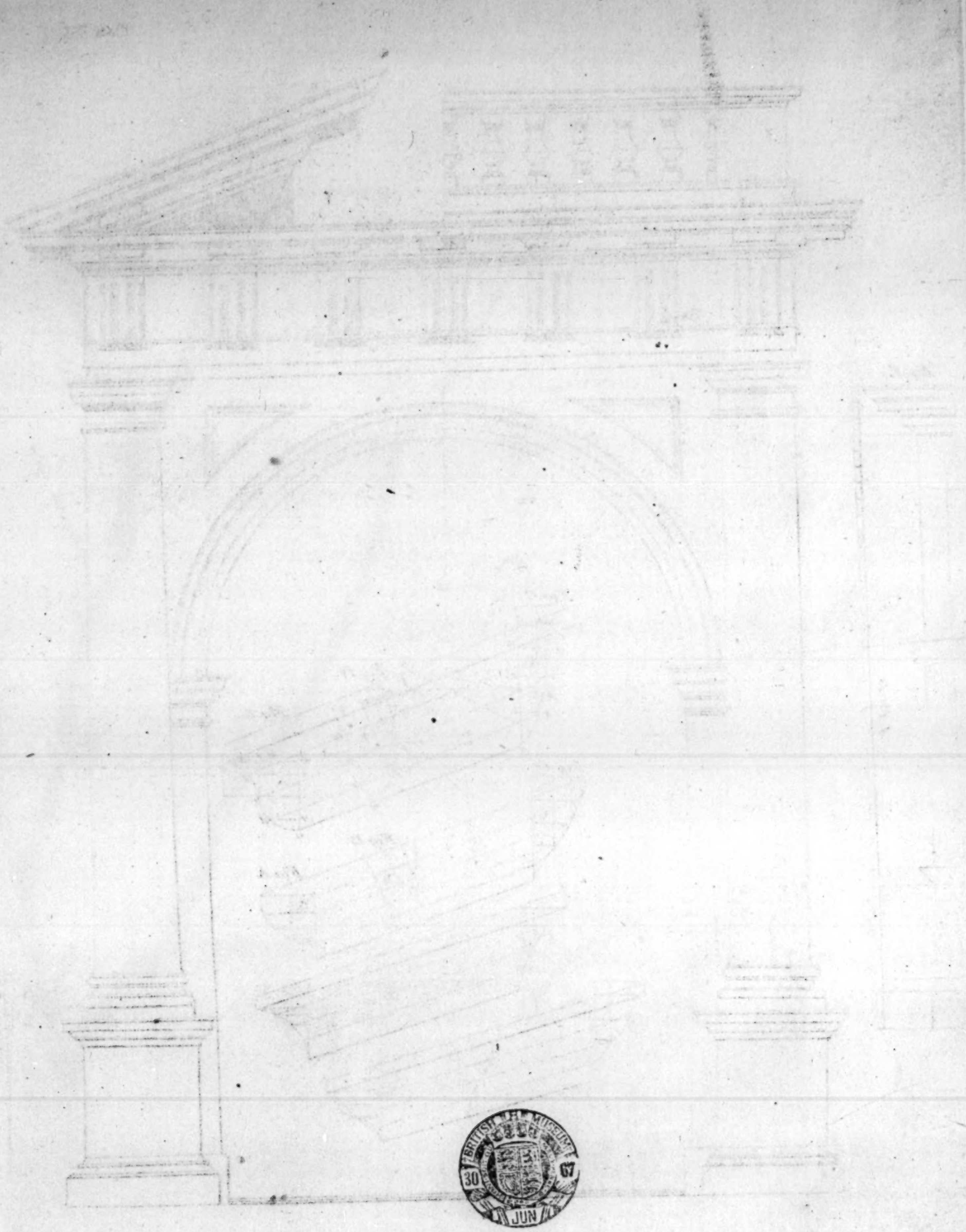


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Plate XVII.

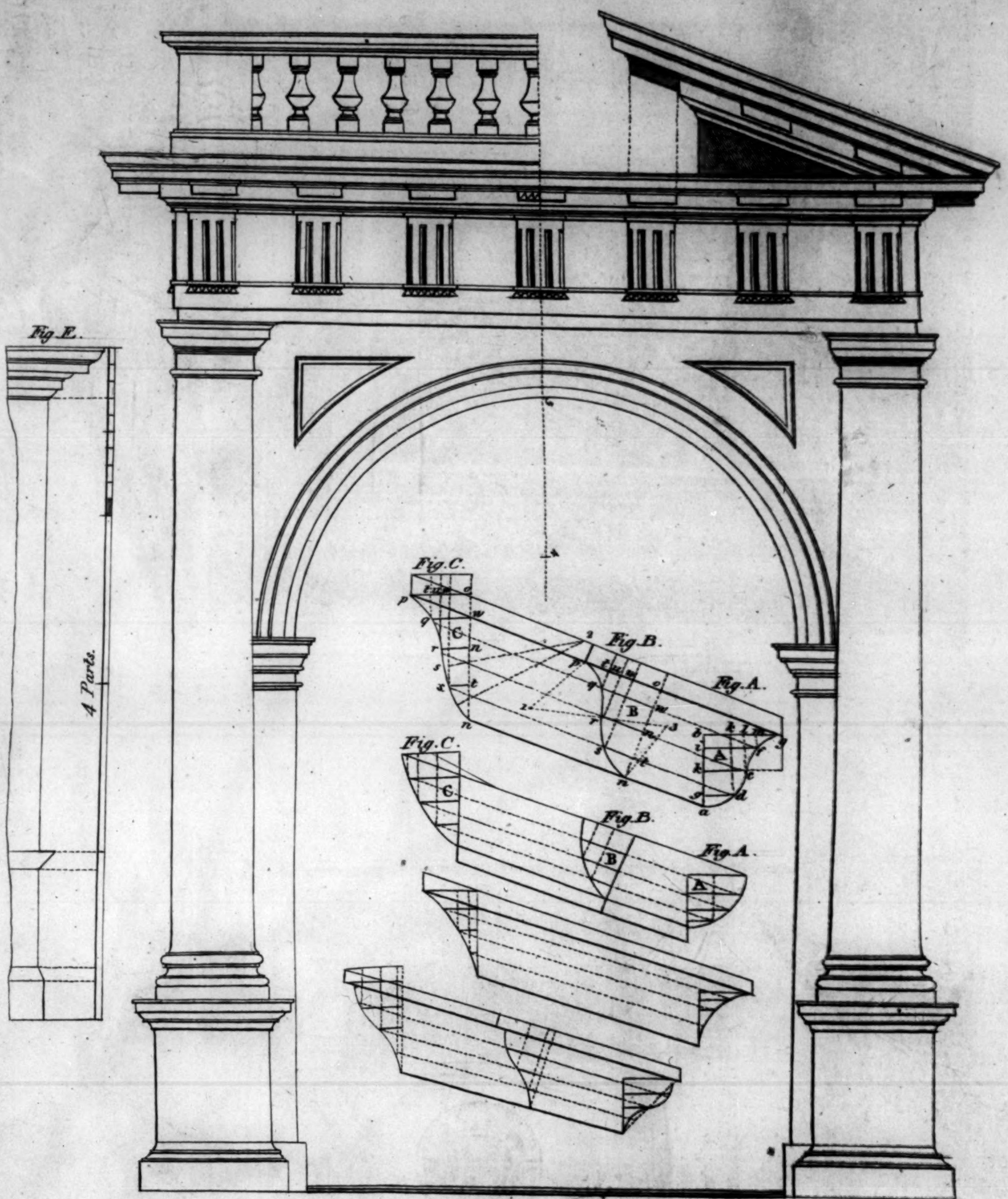

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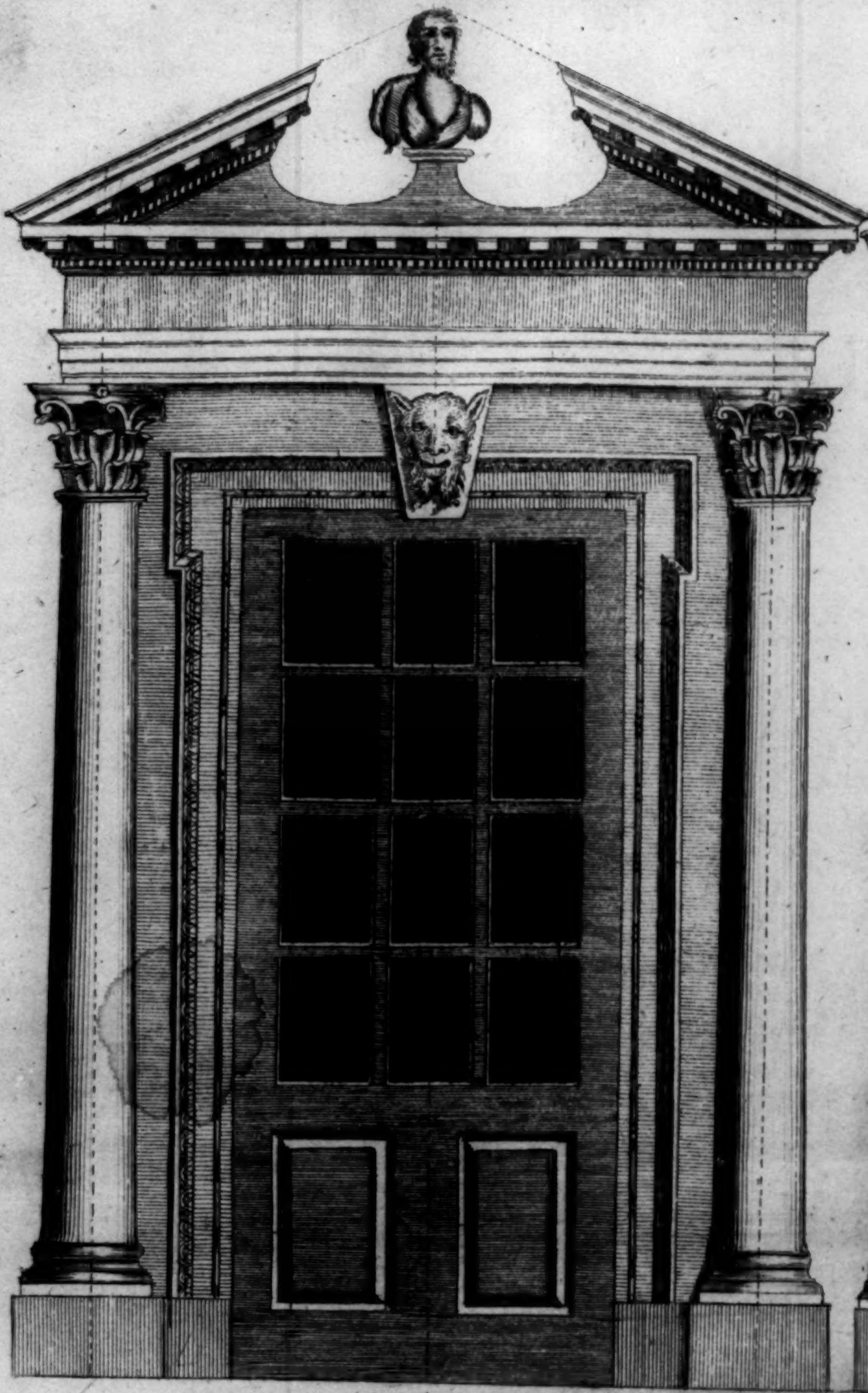
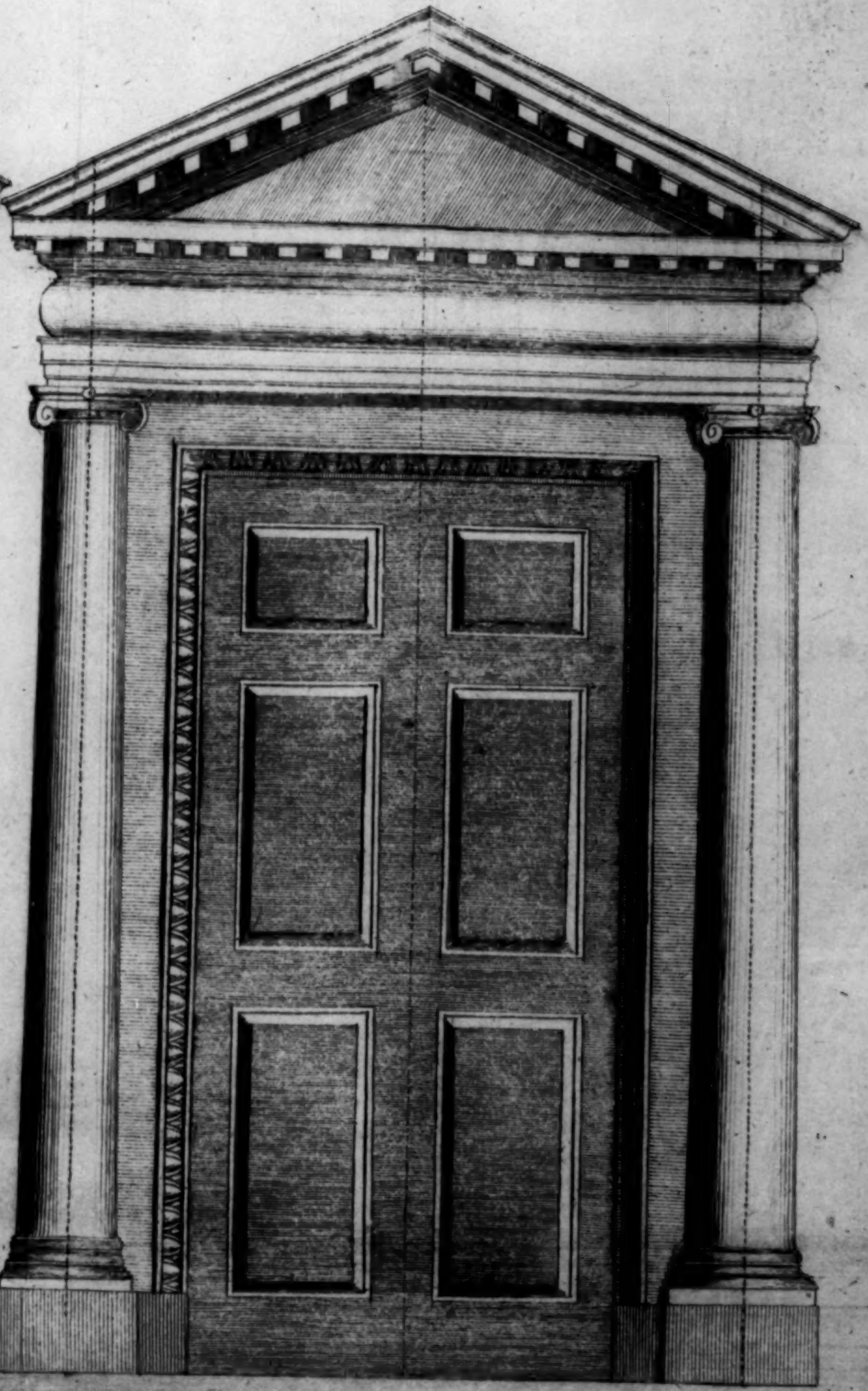
Plate XVIII

Corinthian Door.



Ionic Door.



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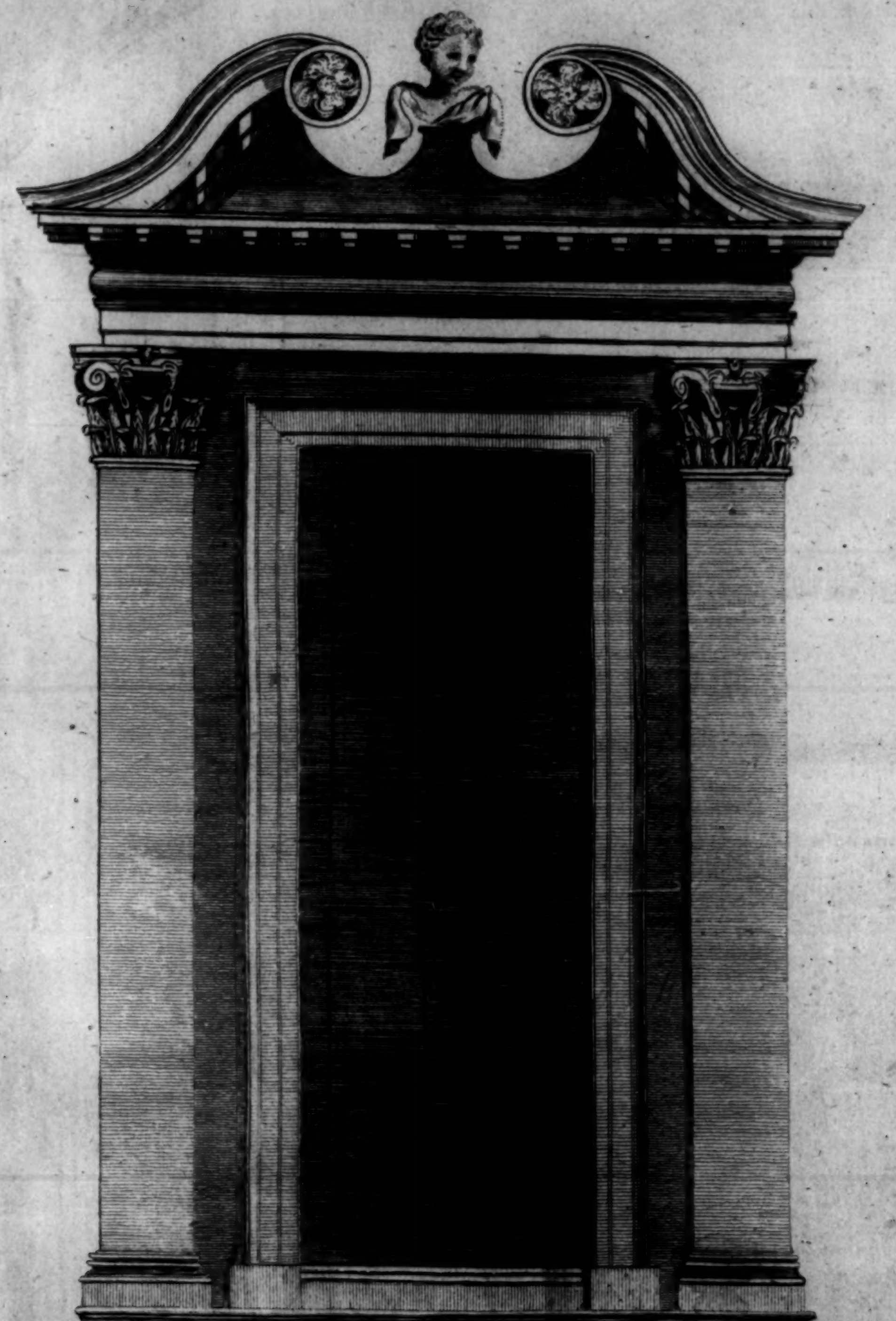
Composite Door



C H A P. X.

The Explanation of Plates 16, 17, 18, 19.

ON Plate XVI. you have a Tuſcan door, with columns upon pedeſtals, the opening or aperture is two diameters in height, which appear by the circles.

Upon the ſame Plate is a Tuſcan Niche of two diameters and one half.

Plate XVII. is an entrance according to the Doric Order, with an open pediment; from central line to central line of the column is 7 diameters, the opening is 5 diameters.

Of Pediments, and the Manner of finding their Raking and returning Mouldings for their Cornices.

Pediments are commonly placed over doors, windows, porticoes, &c. to carry off the rains, and to enrich the order in which they are placed.

Pediments are either enter or open; and thoſe are ſtraight, circular, compound, &c.

An entire ſtraight pediment is generally called, *A Pitched Pediment;* as that given to the Tuſcan door, Plate XVI.

When a pediment conſiſts of more than one arch, as the one given to the Compoſite door, Plate XIX. it is called, *A Compound Pediment.*

Open pediments are thoſe whoſe raking members are ſtopped in ſome certain place between the points of their ſpring and the *faſtigium* or vertical points, as that above the Doric entrance, Plate XVII.

Entire pediments are the firſt kind that were made, and were placed originally over porticoes at the entrances of temples; but now are uſed over doors, windows, &c. for ornament and uſe.

As the entire pediments, by its reclining ſurfaces, carries off and diſcharges the rains at its extremes, therefore, none but entire pediments ſhould be uſed without doors, whilſt the open ones are employed for ornament within, where no rains can come.

In the working of pediments, the great difficulty is to form the curves of the raking and returning cornices, ſo that they may meet at their mitres; for which the following rule is laid down.

RULE. To deſcribe the curve of the raking *cima recta* of a pediment, having the curve of the level cornice given.

Let *a b fig. g.* A, Plate XVII. be the given *cima recta;* divide its curve into 4 equal parts at the points *d e f*; and draw the ordinates *i f*, *k*, *e*, and alſo *g d*; from the points *d e f*; draw the raking lines *f q*, *e r*, *d x*, and the perpendicular lines *d k*, *l m*, *e l*, *f m*: In any place, as at *n o*, draw a right line at right angles to the raking; and making the ordinates in *fig.* B, as *w q*, *n r*, *t s*, equal to the ordinates, *i f*, *k e*, *g d*, in *fig.* A; through the points *q r s*, trace the curve *p q r s n*, which is the curve of the *cima recta* required: And though, ſtrictly ſpeaking, each half is part of an ellipſes; yet, if centres be found that ſhall deſcribe the arch of a

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Plate XX.

Fig. 1.

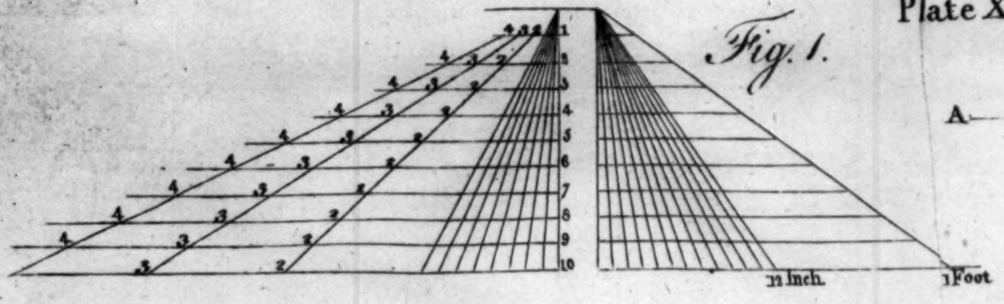


Fig. 2.

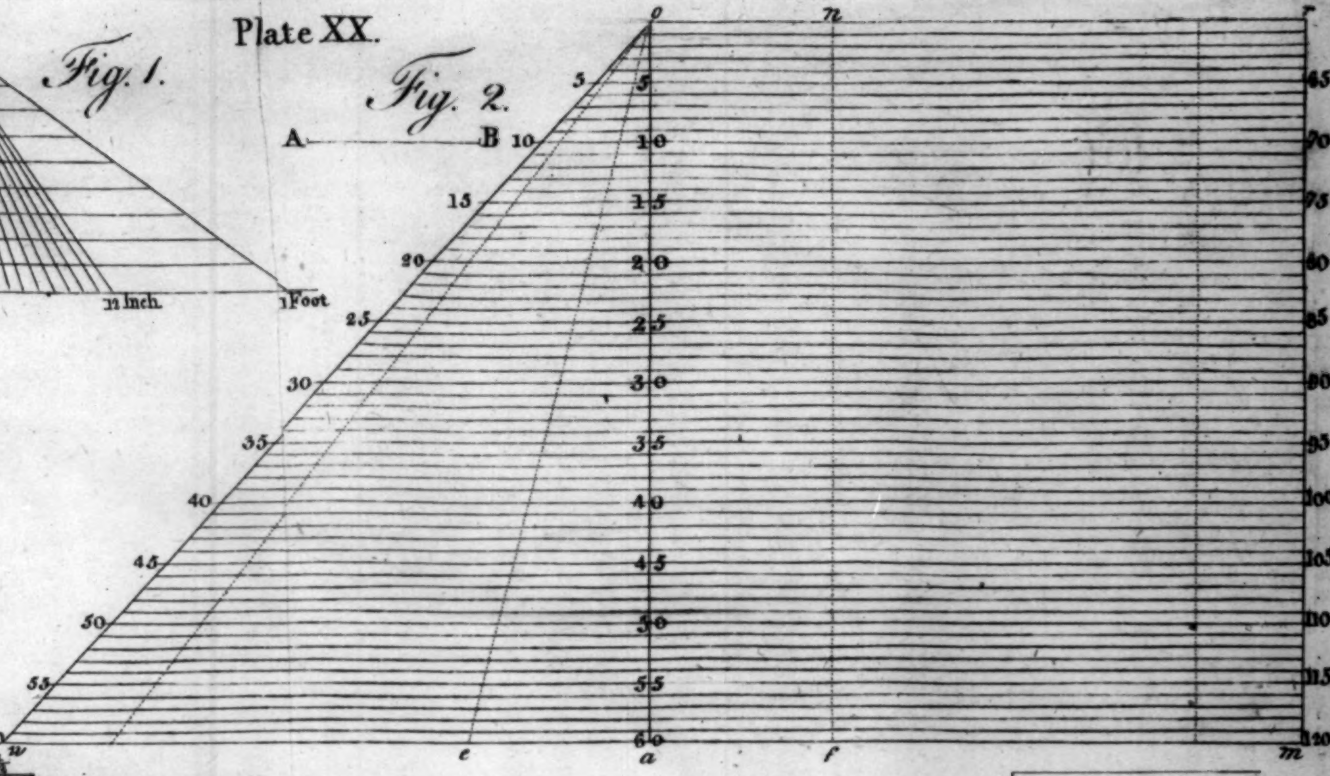
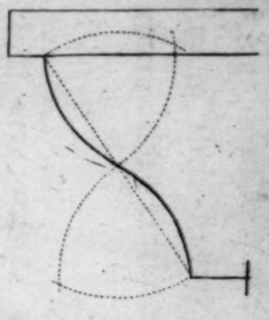


Fig. 3.

The Scanting or Size one Side.	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12
	D P																				
2	0.5	D P																			
2½	0.6	1.0	D P																		
3	1.0	1.2	1.4	D P																	
3½	1.1	1.3	1.6	.0	D P																
4	1.2	1.5	2.0	2.2	2.5	D P															
4½	1.4	1.7	2.2	2.5	3.0	3.3	D P														
5	1.5	2.0	2.4	2.7	3.2	3.6	4.1	D P													
5½	1.7	2.2	2.6	3.2	3.5	4-1	4.4	5.0	D P												
6	2.0	2.4	3.0	3.4	4.0	4.4	5.0	5.4	6,0	S D P											
6½	2.1	2.5	3.2	3.6	4.2	4.7	5.3	5.7	6.4	0.7.0	S D P										
7	2.2	2.6	3.4	4.0	4.5	5,2	5,6	6.2	7.1	0.7.4	0.8,1	S D P									
7½	2.4	3.1	3.6	4.3	5.0	5.5	6.2	6.7	7.4	0.8,0	0.8.6	0.9.3	S D P								
8	2.5	3.2	4.0	4.5	5.2	6.0	6.5	7.2	8.0	0,8.5	0.9.2	0.10.0	0.10 5	S D P							
8½	2.6	3.4	4.2	4.7	5.5	6.3	7.0	7.6	8.4	0.9.1	0.9.7	0.10.4	0.11 2	1.0.0	S D P						
9	3.0	3.6	4.4	5.2	6.0	6.6	7.4	8.2	9,0	0.9.6	0.10.4	0.11.2	1.0 0	1.0,6	1.1.4	S D P					
9½	3.1	3.7	4.6	5.4	6.2	7.1	7.7	8.5	9.4	0.10.2	0.11.0	0.11.7	1.0 5	1.1.3	1.2.2	1.3.0	S D P				
10	3.2	4.1	5.0	5.6	6.5	7.4	8.2	9.1	10.0	0,10.6	0.11.5	1.0.4	1.1 2	1.2,	1.3,0	1.3.6	1.4.5	S D P			
10½	3.4	4.3	5.2	6,0	7.0	7.7	8.6	9.5	10.4	0.11.3	1.0.2	1.1.1	1.2 0	1.2.	1.3.6	1.4.4	1.5.4	1.6.3	S D P		
11	3.5	4.4	5.4	6.2	7.2	8.2	9.1	10.0	11.0	0.11.7	1.0.6	1.1.6	1.2 5	1.3.4	1.4.4	1.6.2	1.6.2	1.7.2	1.8.0	S D P	
11½	3.6	4.6	5.6	6.5	7.5	8.5	9.4	10.4	11.4	1.0.3	1.1.3	1.2.3	1.3 2	1.4.2	1.5.2	1.7.1	1.7.1	1.8.1	1.9.0	1.10.0	S D P
12	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	1.1.0	1.2.0	1.3.0	1.4 0	1.5.0	1.6.0	1.8.0	1.8.0	1.9.0	1.10.0	1.11.0	2.0.0

Fig. 4.



circle to paſs through the three points *p q r*, and *r s n*; it will not be in the power of the moſt exact eye to diſcover the difference.

To deſcribe the Curve of the returned Cornice.

From *p*, *fig.* C, ſet back *p o*, the projection *b g*, in *fig.* A, and draw the perpendicular *o n*, on the top of the fillet *p o*; make the diſtances *p t*, *t v*, *v w*, equal to the diſtances *b k*, *k l*, *l m*, in *fig.* A; and, drawing the lines *w k*, *v r*, *t g*, parallel to the perpendicular *o n*, they will cut the raking lines *q r*, *s x*, which is the curve of the returning *cima recta*, as required; for its ordinates at thoſe points are equal to the ordinates in *fig.* A.

By the ſame rule, the curves of the raking and returned ovoloes, the raking and returned cavettoes, and the raking and returned *cima reverſa*, for the caping of raking mutules and modillions are found, as is evident at firſt view.

Plate XVIII. You have the Ionic and Corinthian doors with columns without pedeſtals.

Plate XIX. Is a door of the Compoſite Order with pilaſters and an ogee pediment.

The Deſcription and Uſe of a Scale for dividing a module into Minutes.

Plate XX.

THE line *a u* is divided into 60 equal parts, by the 60 equidiſtant parallel lines that cut the diagonal line *o u*; and is one of the biggeſt modules that can be made uſe of in drawing an entire Order upon a ſheet of the largeſt paper; *a m* is equal to *a u*; ſo that *u m* is equal to two modules, or 120 minutes. Now, ſuppoſe it were required to take off from this module 20 minutes, ſeek for 20 on the perpendicular line *a o*, and ſet therein one foot of the compaſſes, and on the ſame parallel line extend the other foot to 20, on the diagonal *o u*; and the diſtance then between your compaſſes will be 20 minutes of the module *a u*, as required. Again, Let it be required to take off from thence 80 minutes. Now, as was ſaid before, the diſtance *a m* is equal to *a u*; therefore, of conſequence, all the parallel lines contained between the perpendiculars *a o*, and *m r*, are equal to (*a u*) one module or 60 minutes; therefore, to take off 80 minutes, you muſt ſeek for 80 on the perpendicular *m r*, and therein ſet one foot of the compaſſes, and extend the other on the ſame parallel line to 20, on the diagonal line *o u*, and you have your deſire. It is needleſs to give any more examples in a thing that, at firſt ſight, appears ſo plain.

We ſhall therefore, in the next place, proceed to ſhew, that by this ſcale any other module that is leſs than *a u*, may readily be divided into 60 minutes; and from thence it will appear, that this ſcale is general and univerſally uſeful.

EXAMP. Let the right line AB be a line given to be divided into 60 equal parts or minutes.

PRACTICE. Take within your compaſſes the length of the given line AB, and ſet one foot of the compaſſes in the point *a*, and with that diſtance make 2 points on the line *u m*, as at *e* and *f*; draw the perpendicular line *f n*, and the diagonal line *o e*; then will the given line AB be divided into 60 equal parts by the diagonal line *o e*, as was required; and to make uſe of it is the ſame as is taught above, and needs no repetition. It is beſt to draw

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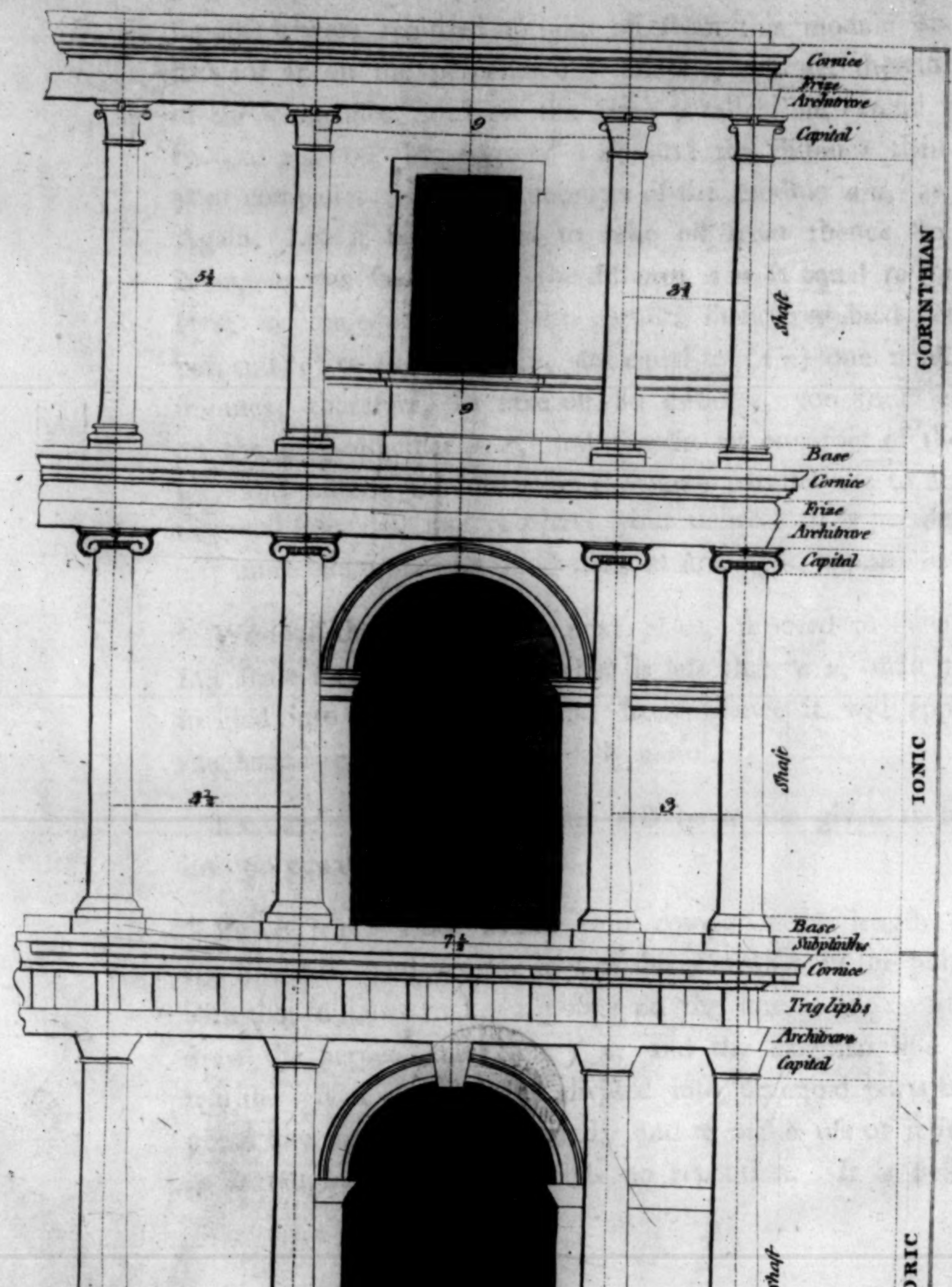
Plate XXI.


Cornice
Frize
Architrave
Capital
9
5½
3¼
Shaft
9
CORINTHIAN
Base
Cornice
Frize
Architrave
Capital
3⅔
3
Shaft
IONIC
Base
Subplinths
7½
Cornice
Triglyphs
Architrave
Capital
Shaft
DORIC
Base
Subplinths
3½
5¼
2½

the lines *o e*, and *n f*, &c. with a black lead pencil; becauſe thoſe lines are eaſily rubbed out, when you have done making uſe of them, with crumbs of bread.

CHAP. XI.

Of the Aſſembling of Orders. PLATE XXI.

OBSERVATION I. WHEN two columns are placed over one another, they muſt be of different orders; the ſtronger always to ſupport the weaker. For inſtance: The Doric may be placed over the Tuſcan; the Ionic over the Doric; the Corinthian, or Compoſite, over the Ionic.

OBS. II. The upper order muſt be always leſs maſſive than the under, agreeable to the maxim, That the ſtronger ought to ſupport the weaker.

OBS. III. The columns ought to ſtand exactly over each other, ſo that their two axiſes may be both found in the ſame perpendicular.

OBS. IV. The diſtances between the lower columns muſt be determined by the intercolumniations of the order, that is, without pedeſtals; and the diſtances of the upper columns by the intercolumniations of the order with pedeſtals; taking care, by the way, that the firſt order be mounted on a pretty high zocle, or on an aſcent of ſeveral ſteps, to ſerve inſtead of a continued pedeſtal or foot.

To the upper order we give a pedeſtal; becauſe being confined to the breadth of the intercolumniation of the lower order, its columns, by this means, are rendered ſmaller, inſomuch, that the diameter of their baſe does not exceed that of the top of the under columns; which is a rule that ought not to be diſpenſed withal.

How to find the Module of an Order that is to be placed over another. It is here propoſed, for inſtance, to place the Ionic *Order over the* Doric.

Suppoſe, in the firſt order, the columns be placed at the diſtance of 5 modules from each other, in porticoes.

That in the Ionic Order with a pedeſtal, the columns are 7 modules 30 minutes apart; and that, to place this order upon the Doric, you muſt divide the intercolumniation of the lower order, into ſeven and a half equal parts; one of which ſeven and a half will be the module for raiſing the Ionic Order upon the Doric. Or, which is a better rule, the diameter of the columns of the upper order, at the baſe, muſt be equal to that of the top of the under columns.

Of Pilaſters placed one over another.

As pilaſters are of the ſame bigneſs from top to bottom, one would imagine, at firſt ſight, that to preſerve a regularity, the pilaſters placed one over another ſhould likewiſe be of the ſame bigneſs; but there are two reaſons that oblige us to recede from this rule.

The *firſt* is, That as the orders increaſe in delicacy, they likewiſe increaſe in height, with regard to their bigneſs: So that were the module to continue the ſame in the upper and under pilaſters, the conſequence would be, that the orders and ſtories would increaſe in height, in proportion as they riſe over one another, which would be prepoſterous.

The *ſecond* reaſon is, That, if there ſhould be columns along with the pilaſters of the lower order, the diameter of the upper pilaſters would be bigger than that of the top of the columns underneath, which would be another fault.

One ſhould never therefore place two pilaſters of the ſame bigneſs over one another, unleſs the upper be Attic.

In the aſſembling of pilaſters, all that is required, is, to examine how big the baſe of the upper pilaſter may be, with regard to the top of the under; for the pilaſters being always equally big at top as at bottom, it follows inevitably, according to the preceding rules, that, preſerving the ſame number of modillions in the two orders, the upper order always becomes leſs than the under, as in effect it ſhould be.

PLATE XXI. Conformable to the above rules is this plate, where you have various intercolumniations according to the number of trigliphs or modillions between; thus, in the *Doric*, for one trigliph is 2 diameters and ½; for 2 trigliphs 3 and ¾; and for 4 trigliphs 6 diameters and ¼, from centre to centre. Here is alſo ſhewn how arches may be uſed over each other; and, each part being figured, cannot need farther explanation.

The beauty reſulting from theſe obſervations is ſufficiently ſeen in thoſe noble piles of building, the banqueting-houſe at *Whitehall*, and the new treaſury in *St James's Park*.

C H A P. XII.

Of WINDOWS. PLATE XXII, XXIII, &c.

WINDOWS ſhould be proportioned according to the heights of the different ſtories: *Fig*. A, *Plate* XXII, is a Tuſcan window, whoſe height is 1 diameter $\frac{3}{4}$; *Fig*. B, is a Doric window, which is 2 diameters; *Fig*. C, is an Ionic window, which is likewiſe 2 diameters; *Fig*. D, is a Corinthian window of 2 diameters $\frac{1}{5}$; *Fig*. E, is an ox-eye round; *Fig*. F, is a perfect ſquare; *Fig*. G, is equal to the diagonal of *Fig*. F; *Fig*. H and K, are 2 diameters each; *Fig*. M, is 1 diameter $\frac{4}{5}$; *Fig*. I, is a niche of 2 diameters, excluſive of the plinth on which a ſtatue may be placed. On *Plate* XXIII, is a ruſtic door and window from Palladio, and a Venetian window from S. Le Clerc. The ſlip windows in this example are only $\frac{1}{3}$ of the diameter of the principal window; whereas they are now made equal to $\frac{1}{2}$ the diameter, or day light of the principal window, ſo as to admit of two lozenges.

Of the Ornaments of Doors and Windows.

They may be made divers ways, as they are repreſented on *Plate* I. *Fig*. 2, and 3; and on *Plate* XXIV. *fig*. 4, and 6: For the better underſtanding of which, there is ſet down the heights and projections of every member by a module and minutes.

The module is the aperture, or breadth of the door, divided into 60 equal parts or minutes.

The ornaments given to doors and windows, are the architrave, frize, and cornice. The height and projection of every member, *Plate* XXII

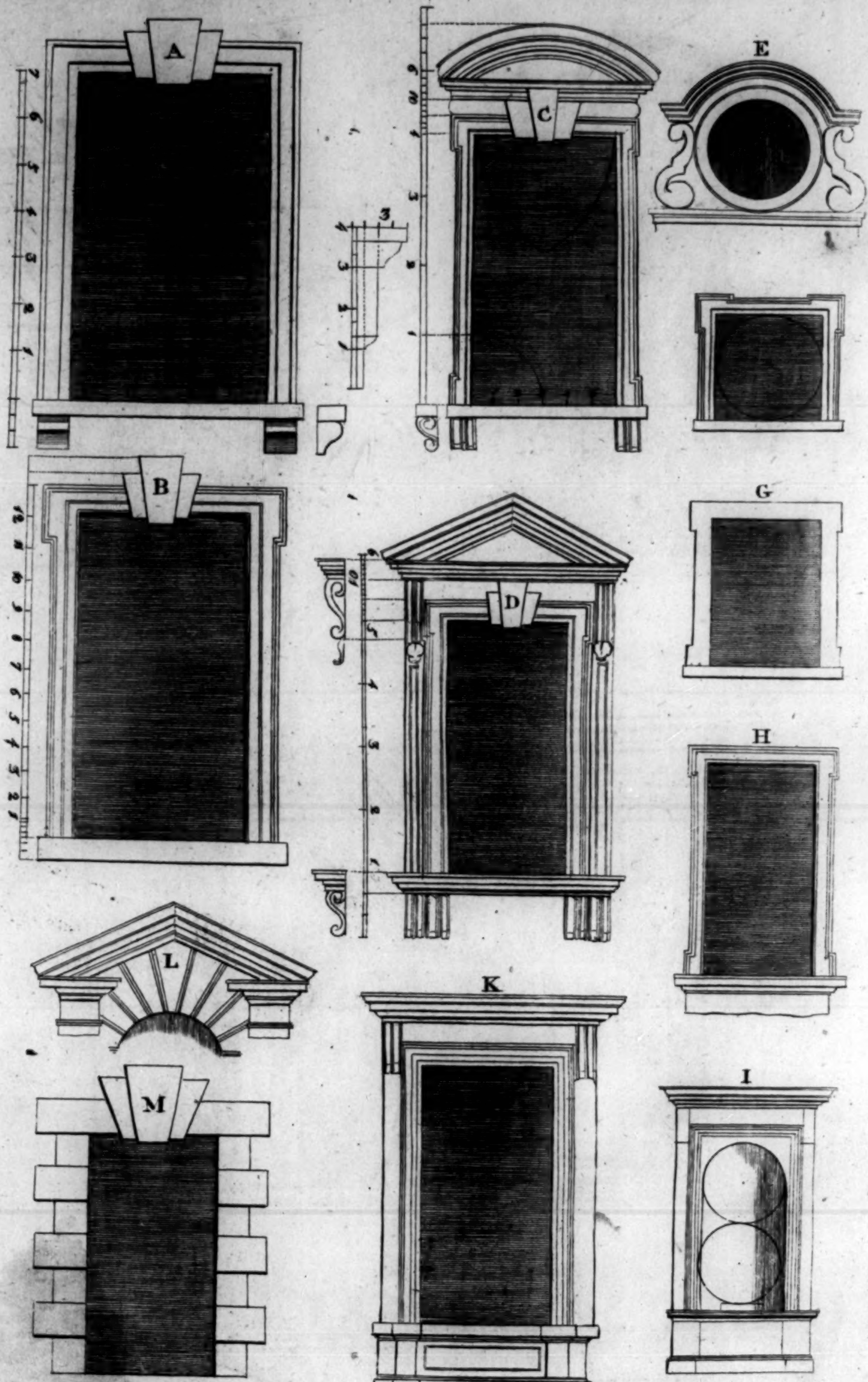


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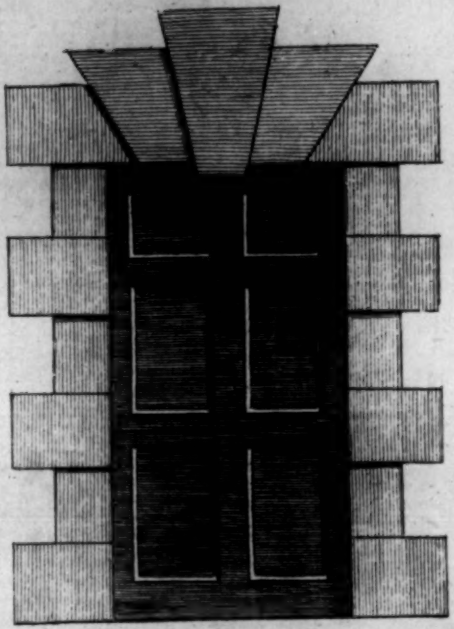
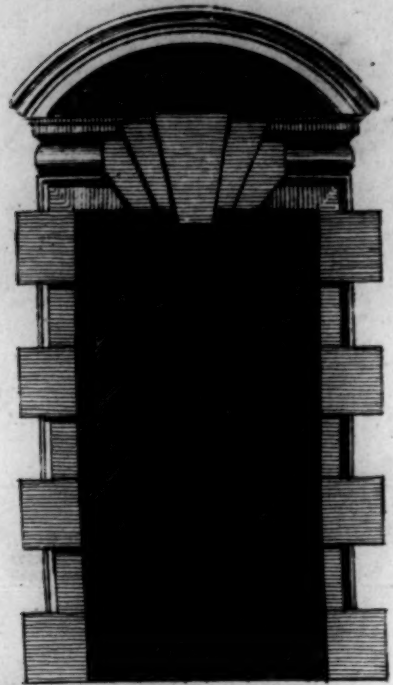
Plate XXIII.

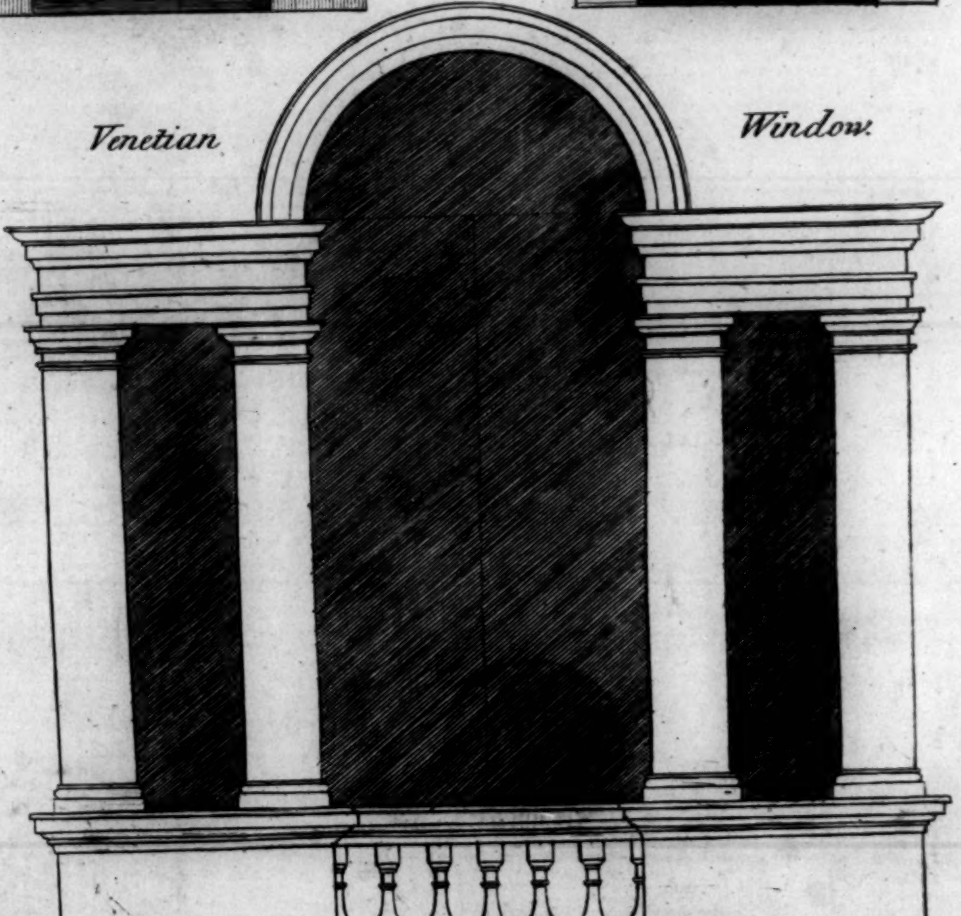
Rustic Door.



Rustic Window.



Venetian Window.



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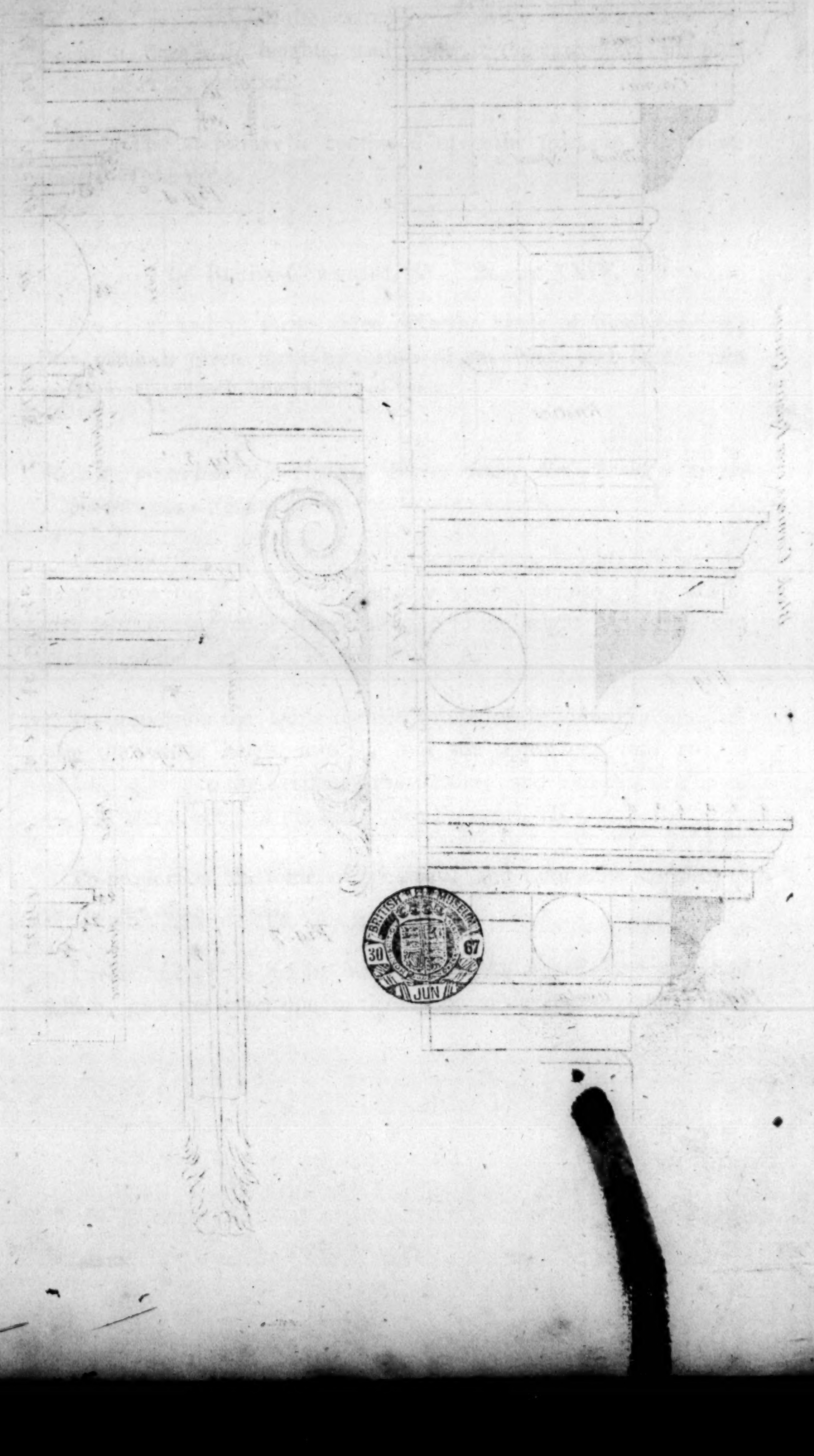

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Plate XXIV.

Quoins

Block Cornices over Rustic Quoins

Fig. 1.

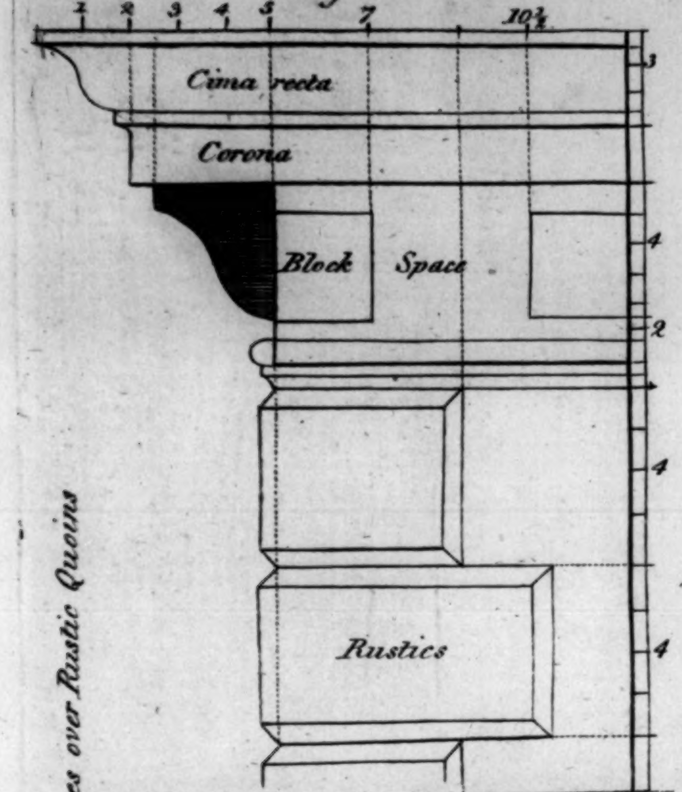


Fig. 2.

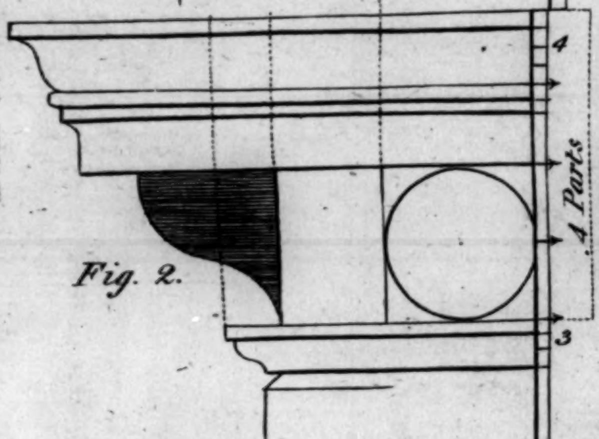


Fig. 3.

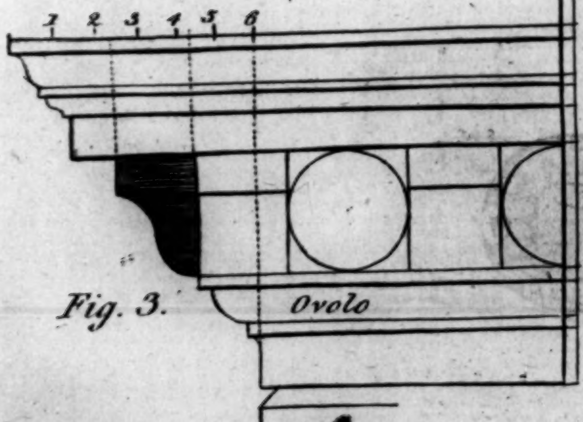


Fig. 4.

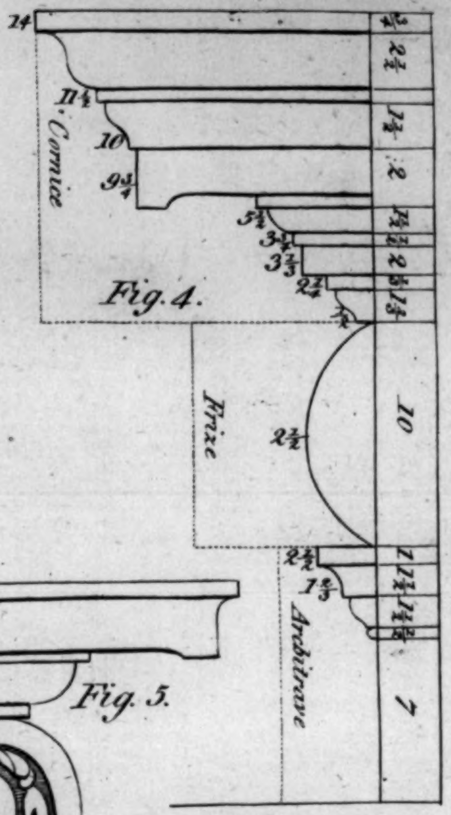


Fig. 5.

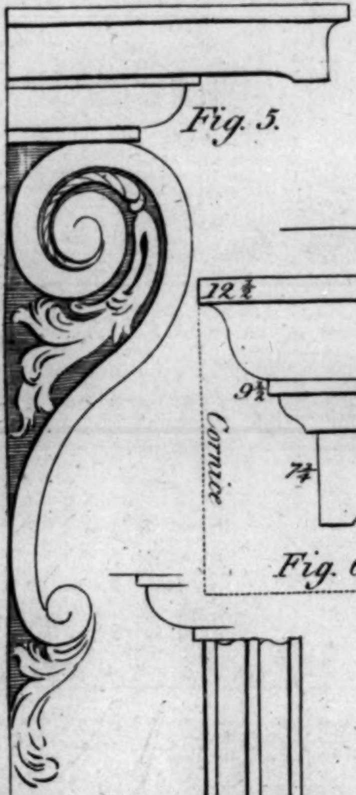


Fig. 6.

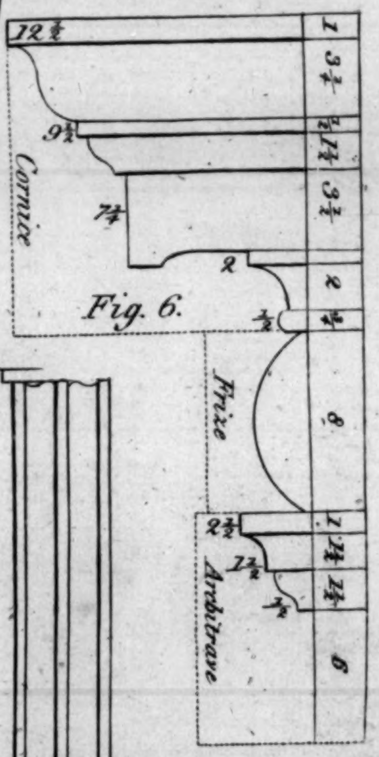
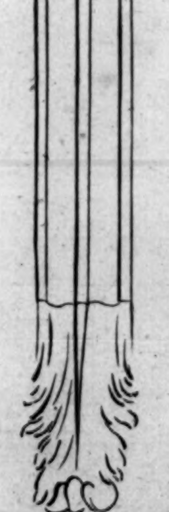


Fig. 7.



the rein contained, is ſhewn by the figures placed at the ground or raked line; and, at the extremity of every member, thoſe between the lines is the heights, and thoſe at the extremity, the projection of every member.

Note, The architrave is continued upon the ſide, as well as on the top of the door.

Of Block-Cornices, &c. Plate XXIV.

Fig. 1, 2, and 3. ſhews three different kinds of block-cornices; that name is given them by reaſon of the voids and ſolids, like modillions, made in the middle of them.

How to proportion the Tuſcan, Doric, Ionic, &c. *Cornices to the Height of any Room.*

To proportion the Tuſcan to a room of any height, divide the height from the floor into 5, and the upper one into 5; of which, give 3 to the height of the cornice, 2 to the height of the rail and breadth of the ſtile. *See* Plate XII. *fig.* A.

To proportion the Doric cornice to the height of any room, divide the whole height into 4, and the upper one into 10; of which, give 3 to the height of the cornice, and 2 to the height of the rail and breadth of the ſtile. See Plate XVII. *fig.* E.

To proportion the Ionic, Corinthian, and Compoſite cornices to the height of any room.

Divide the whole height into 3, and the upper one into 5; of which, give the upper one to the height of the cornice, and 3 fifths of the next to the height of the rail and breadth of the ſtile. *See* Plate XXV. *fig.* 9.

On *Plate* XXV. *fig.* 4. Is an example of a cantaliver cornice at large, which in lofty rooms, under a cove, has a very grand effect; the breadth of a cantaliver is $\frac{1}{4}$ of its height, which is equal to the height of the frize, and the diſtance they are placed at, is the ſame as their heights, which makes the metops exactly ſquare as the Doric Order.

Of COVES *to* CIELINGS.

Coves to Ceilings are of various heights, *viz.* $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{8}$, $\frac{2}{7}$, $\frac{2}{9}$, &c. of the whole height of the room.

A cove of $\frac{1}{4}$, as *fig.* 3. *Plate* XXV. is fit for a lofty room or hall, &c. which is thus proportioned: divide the whole height of the room into 20 parts, give 5 to the cove, and 2 to the entablature.

To deſcribe an angle-bracket for any cove, ſuppoſe B, *fig.* 6, *Plate* XXV.

Let *a b c* be a front-bracket, and *a f* the baſe over which the angle-bracket is to ſtand: In C draw ordinates from its curve to its baſe *a n*, at any diſtances, and continue them till they meet *a f*, the baſe of the angle-bracket; from whence raiſe ordinates at right angles to the ſaid baſe, and, making them reſpectively equal to thoſe in C; through their extremes trace the curve *a n e*, which is one quarter of an ellipſes, and the curve of the angle-bracket required.

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Plate XXV

Fig. 5.

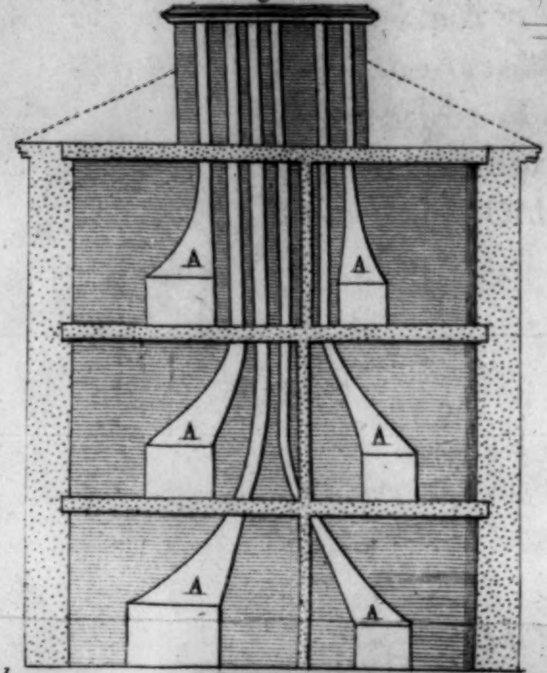

Fig. 1.

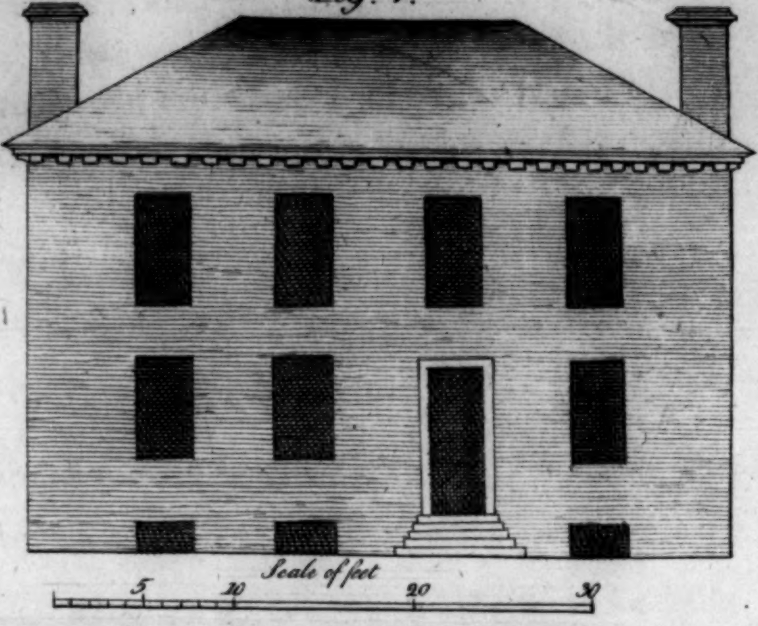

Fig 6.

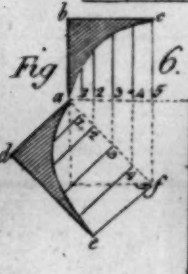

Fig. 7

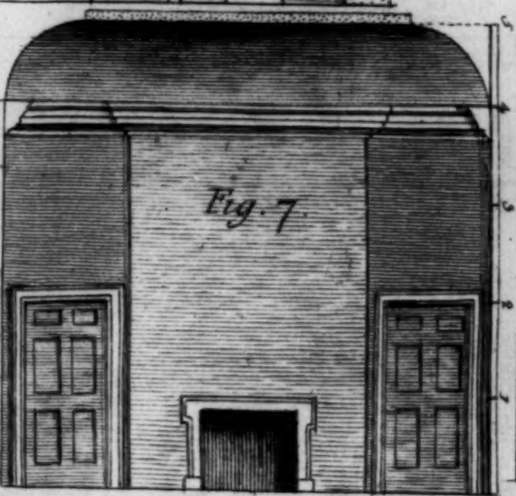

Fig. 2.

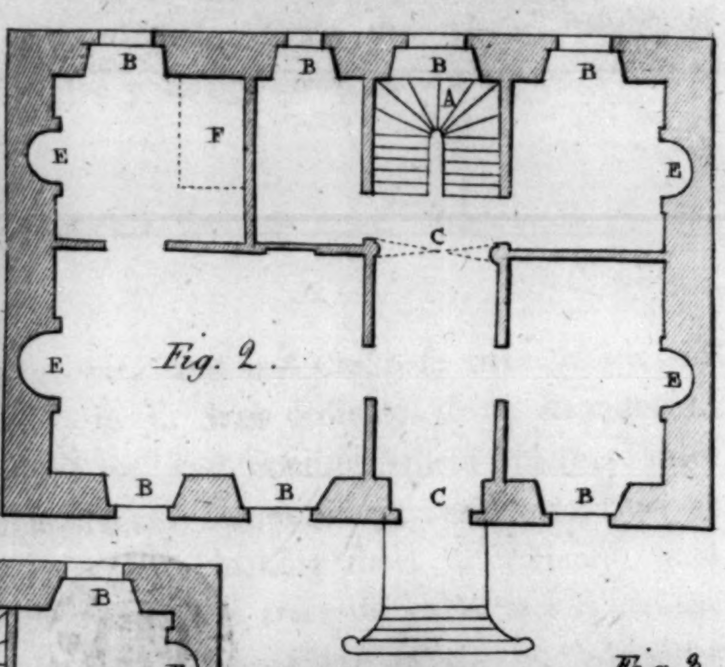

Fig. 9.

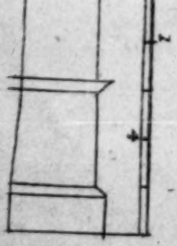

Fig. 8.

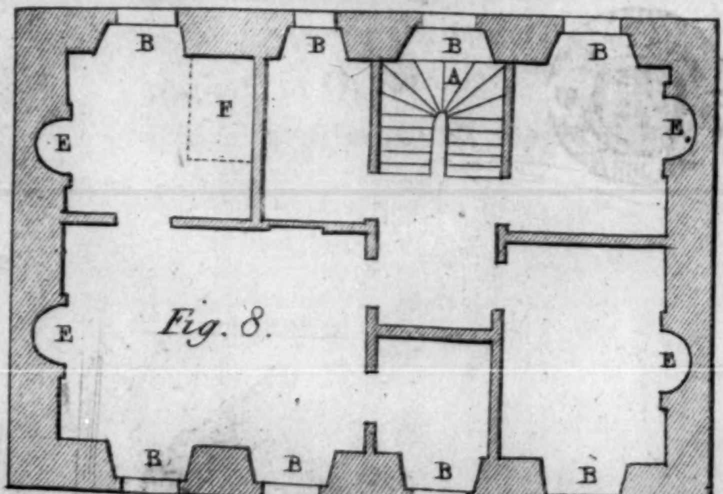

Fig. 4.

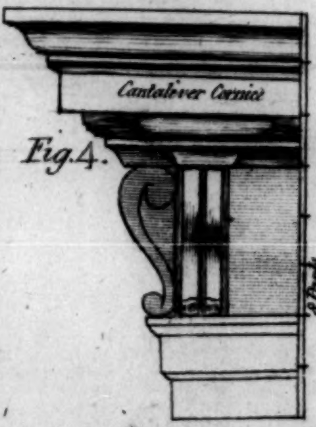

Fig. 3.

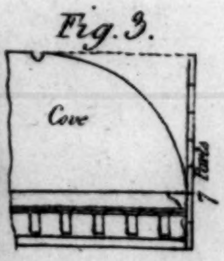

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Fig. D.

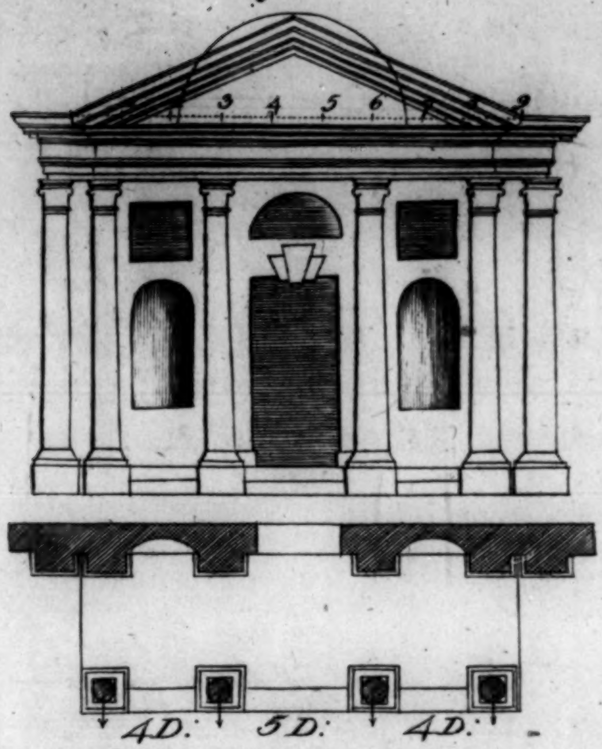


Fig. A

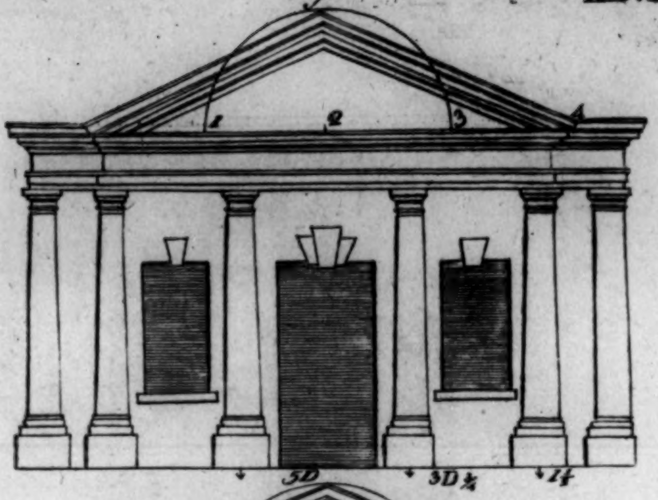


Fig. B

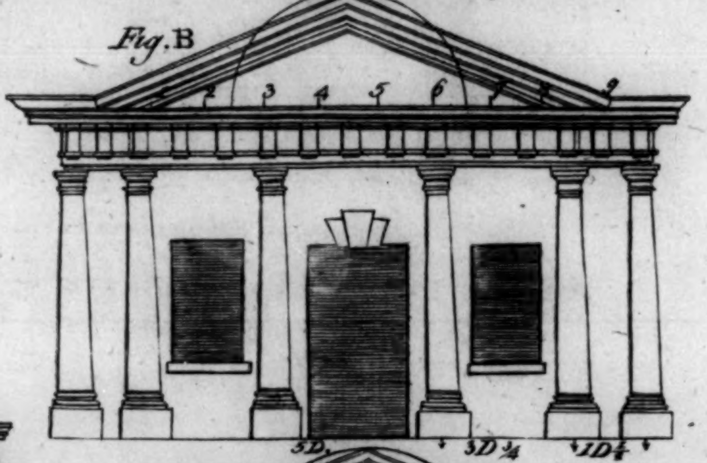


Fig. C

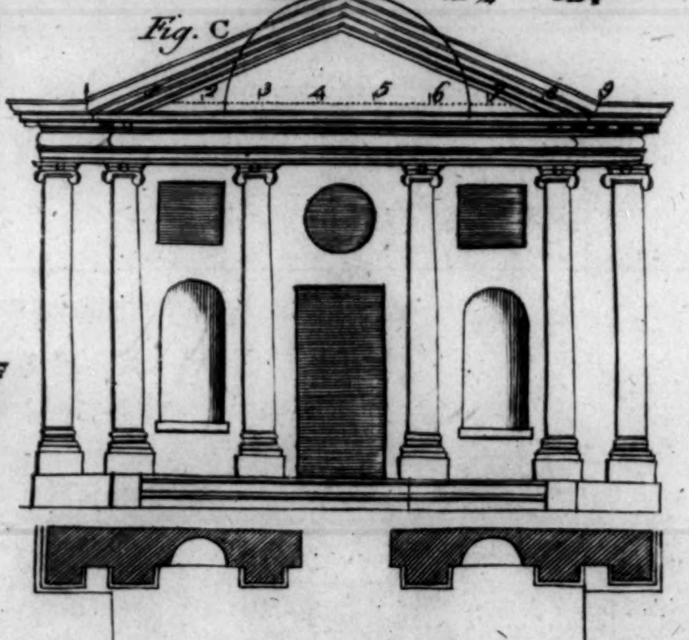


Fig. G

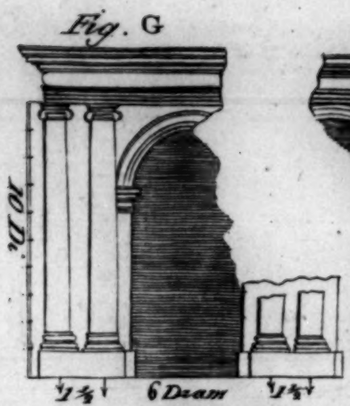


Fig. E

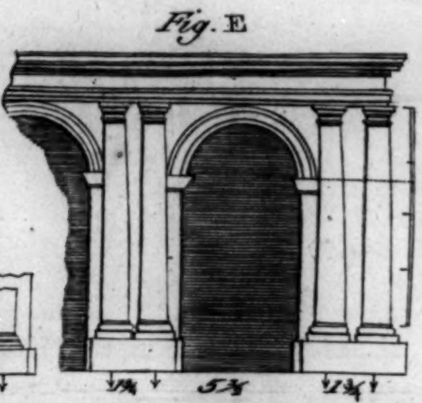


Fig. H

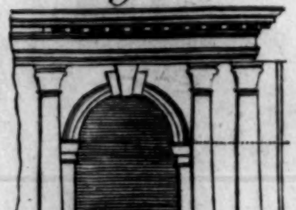
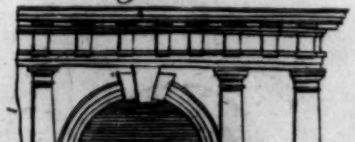


Fig. F



A cove, as *fig.* 7. *Plate* XXV. is fit for a very grand room, and thus proportioned.

Divide the whole height into 5, give one to the cove, and ⅓ of the next to the cornice, which is Doric without mutules.

One general Rule for finding the Curves of the neceſſary Ribs for Groins.

In *Plate* XXIX. *fig.* 4. Let *a b c d* be the plan, and the ſemicircle *a c b*, an end-rib, and *e f*, its height; draw the diagonal lines *a d*, reſpectively equal to the ordinates 1, 2, 3, 4; and then, tracing their curves through their extremes, it will be the curve for the diagonal rib, as required.

By the ſame rule, the ribs for all other kinds of regular or irregular groins are found, be their plans what they will, and their arches ſemi-circular, ſemi-elliptical, or ſcheme; as is evident by the figures 5, 6, 7, and 8, upon the above Plate.

Fig. 1. *Plate* XXV. Is the elevation of a ſimple houſe, of which *fig.* 2. and 8. is the plans of two of the ſtories; *fig.* 2. is the ſecond ſtory; CC, repreſents the principal door with the paſſage to the ſtair-caſe; A, the ſtair-caſe; the diagonal pricked lines at C repreſent an arch in a plan, there being an arch over the paſſage at C, betwixt two ſmall columns or pilaſters; BB, the manner of repreſenting windows in a plan; the ſemicircles E, is the manner repreſenting the vents; F the bed-places.

Fig. 5. Is a ſection of one of the gables; A is the vents.

Plate XXVI. *fig.* A, Is a Tuſcan portico; *fig.* B, is a Doric portico; *fig.* C, a Ionic portico, with its plan; *fig.* D, is a Corinthian portico, with its plan; *fig.* E, is an arcade to the Tuſcan Order; *fig.* F, is an arcade to the Doric Order; *fig.* G, is an arcade to the Ionic Order; *fig.* H, is a Corinthian arcade.

Theſe porticoes and arcades may be eaſily underſtood by inſpection; as they are marked with figures upon the Plate.

CHAP. XIII.

A DESCRIPTION *of the ſeveral Sorts of* STAIR-CASES, *and the Formation of all ſorts of* TWISTED RAILS.

Of STAIR-CASES.

GREAT care ought to be taken in placing of the ſtair-caſe in any building; but commonly the ſtairs are placed in the angle, wing, or middle of the front.

To every ſtair-caſe are required three openings.

Firſt, The door leading thereto.

Secondly, The window, or windows, that give light to them; and, *thirdly*, their landing.

Firſt, The door leading to a ſtair-caſe, ſhould be ſo placed, that moſt of the building may be ſeen before you come at the ſtairs; and in ſuch a manner, that it may be eaſy for any perſon to find out.

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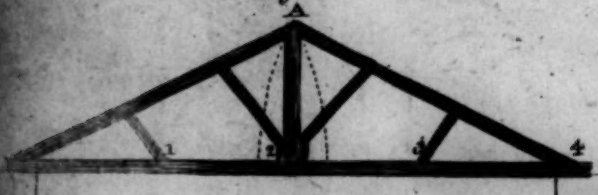
Plate. XXVII.

Fig. 1.



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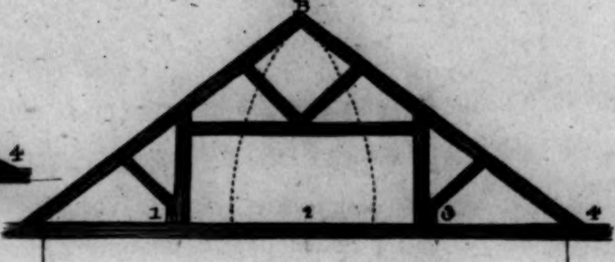
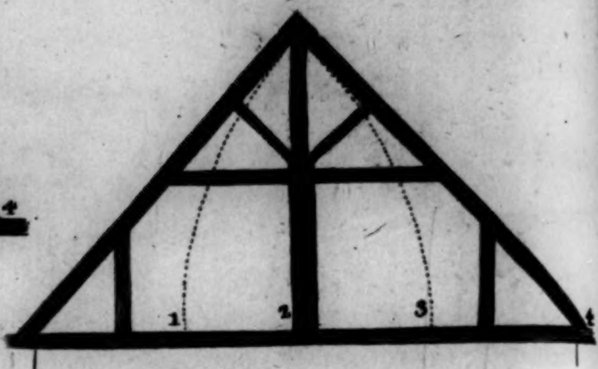


Fig. 3.



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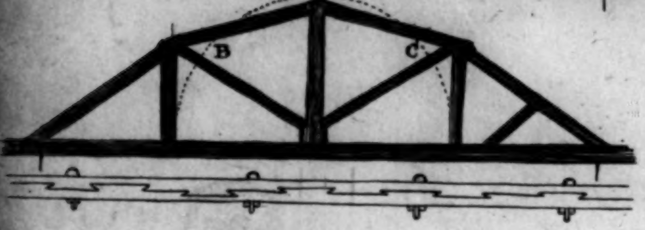

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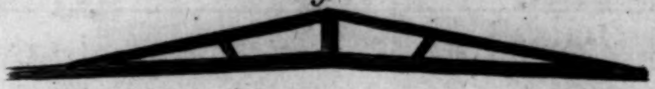

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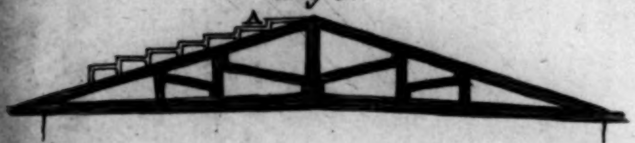

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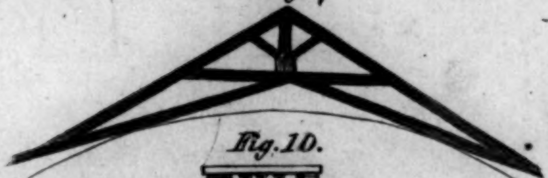

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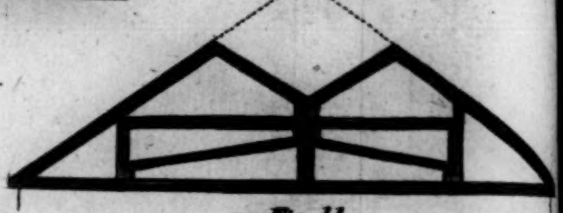

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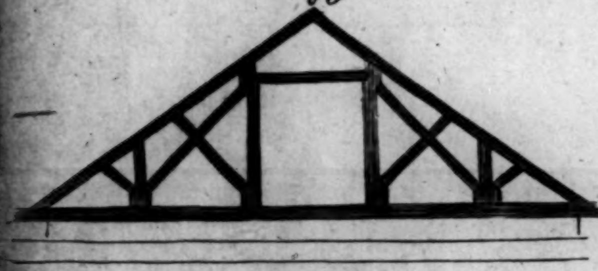

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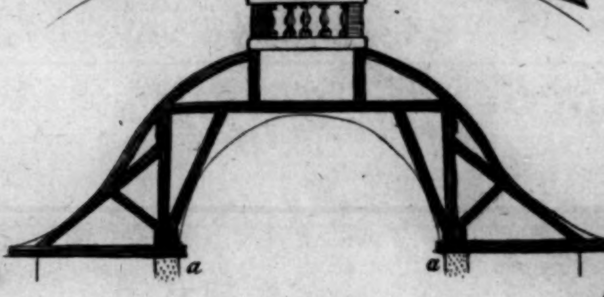

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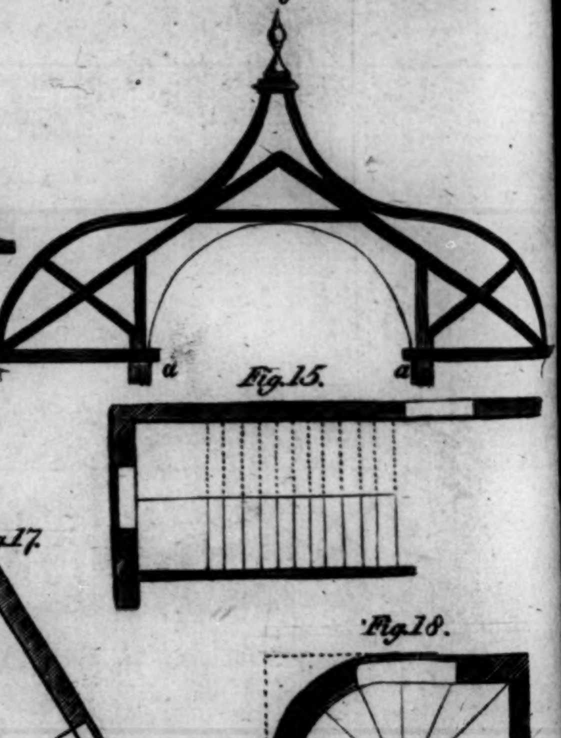

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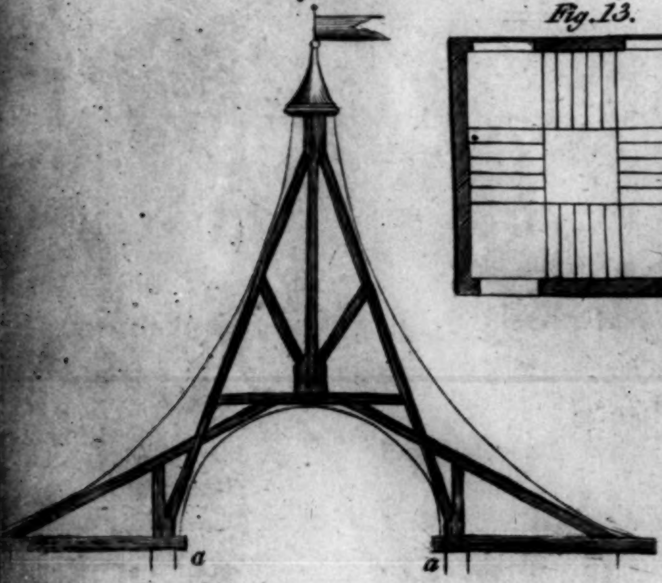

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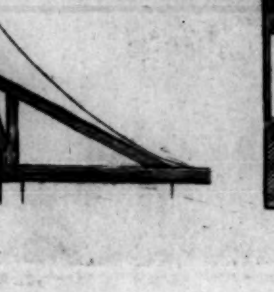

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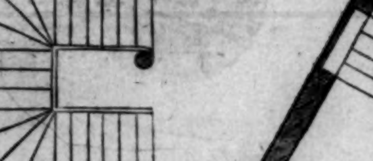

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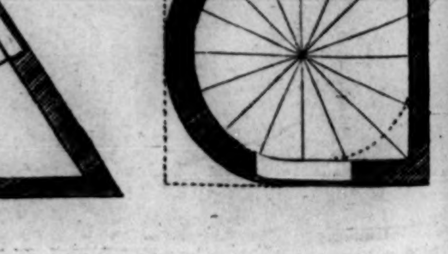

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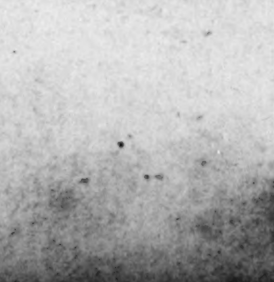


Fig. 17.

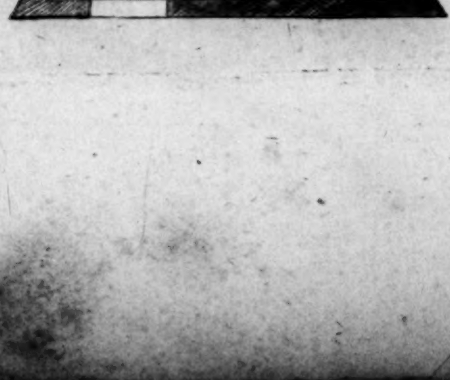
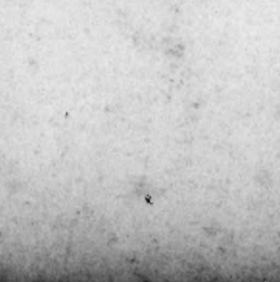


Fig. 18.



Secondly, For the windows: If there be but one, it muſt be placed in the middle of the ſtair-caſe, that thereby the whole may be enlightened.

Thirdly, The landing of ſtairs ſhould be large and ſpacious, for the convenient entering into the rooms: In a word, ſtair-caſes ſhould be *ſpacious*, *light*, *and eaſy in aſcent*. The height of large ſteps muſt never be leſs than ſix inches, nor more than ſeven inches and a half.

The breadth of ſteps ſhould never be leſs than 10 inches, nor more than 18 inches; and the length of them be not leſs than three feet, nor more than 12 feet.

In making of ſtair-caſes, this rule ſhould be obſerved: That the number of ſteps at every landing be odd, and not even; for, thereby, when you begin to aſcend with your right foot firſt, as all perſons generally do, you will end with the ſame foot alſo.

C H A P. XIV.

Of the ſeveral Sorts of STAIR-CASES. PLATE XXVII.

Firſt, Of making them.

THOUGH there are rules laid down in the foregoing chapter, for the height and breadth of ſteps; yet workmen are not ſo ſtrictly tied to thoſe rules, as not to vary in the leaſt from them: For they muſt ſtill obſerve to make all the ſteps of the ſame ſtair-caſe of an equal heighth and breadth: To do which, they muſt firſt conſider the height of the room, as alſo the width, or compaſs, they have to carry up the ſtairs in.

Then, to find the height of each particular ſtep, they ought firſt to propoſe the height of each ſtep, and by that propoſed height divide the whole height of the room; which done, the quotient will ſhew the number of ſteps: But if the diviſion fall not out exact, but that there be a remainder; then, in this caſe, take the quotient, not regarding the remainder, for the number of ſteps, and by that number divide the whole height of the room; ſo the quotient ſhall give you the exact height of each ſtep.

EXAMP. Suppoſe the whole height of the room be 9 foot 3 inches, and ſuppoſe you deſigned to make each ſtep 6 inches high, turn the whole height of the room into inches, and divide thoſe inches by 6, the quotient will be 18, and the remainder 3; therefore take 18 for the nnmber of ſteps, and by it divide 3, and the quotient will be $6\frac{3}{18}$, or $6\frac{1}{6}$ inches; which muſt be the exact height of each ſtep.

Then to find the breadth of each ſtep, divide the ſpace or compaſs that you have to carry them up in, by the number of ſteps, the quotient will ſhew you the breadth of each ſtep.

The ſeveral KINDS of Stairs.

There are many kinds of ſtair-caſes; for in ſome the ſteps are made ſtrait; in others winding; in others mixed of both. Of ſtrait ſtairs, ſome fly directly forward; others are ſquare; others triangular; others are called *French flights*, or *winding ſtairs*, which in general are called *Spiral* or *cockle-ſtairs;* of which ſome are ſquare; ſome circular, or round; and ſome elliptical, or oval; and theſe again are various; for ſome wind about a ſolid; others, about an open newel. Stairs mixed of ſtrait and winding ſteps are alſo of various kinds; ſome are called *dog-legged*; ſome there are that wind about a ſolid newel, and others that fly about a ſquare open newel.

There might be a larger deſcription given of every one of theſe kinds of ſtair-caſes; but, if theſe are well underſtood, it will be eaſy to compoſe other ſorts from the following figures:

Of STRAIT STAIRS. *Fig.* 14. *Plate* XXVII.

Theſe are ſuch as always fly, and never wind, and are by ſome called *flyers;* going directly from one floor to another, without turning to the right or the left.

Square Flyers. Fig. 13.

Theſe fly round the ſides of a ſquare newel, either ſolid or open, and are of two kinds; and at every corner of the newel there is a ſquare foot-pace that takes up $\frac{1}{4}$ of a circle.

Triangular Flyers. Fig. 17.

Theſe fly round by the ſide of a triangular newel, either ſolid or open, and are of two kinds. At each corner of the newel is a trapezial foot-pace that takes up $\frac{1}{3}$ of a circle; the length of the ſtairs is at right angles with the ſide of the newel.

French Flyers. Fig. 15.

Theſe kind of ſtairs, firſt fly directly forward, till they come within the length of a ſtep of the wall, and then they have a quarter-pace, from which you immediately, without any ſteps between, aſcend to another quarter-pace; and from this ſecond quarter-pace the ſtairs fly directly back again, parallel to the firſt flight.

Winding Stairs. Fig. 18.

Theſe are ſuch as always wind, and never fly: There are many kinds of theſe ſtairs that wind round either a circle, an oval, a ſquare, or an equilateral triangle; and of each of theſe, ſome wind round a ſolid newel, and others round an open or hollow newel.

Mixed Stairs. Fig. 15.

Theſe are ſuch as do both fly and wind; and therefore are by ſome called by the general name of *flyers* and *winders:* Here is alſo ſhewn a twiſted rail at the beginning of the firſt flight, and the manner of forming it. *See the next* Chapter.

CHAP. XV.

To form the Arch, or Mould, to the Hand Rail of a Pair of Stairs, which is to be circular, Part of the two firſt Steps, ſo as to make it ſtand perpendicular over the Ground, or Plan, and the Manner of ſquaring the Rail, without ſetting it up in its Poſition.

PLATE XXVIII. *Fig.* 1.

HAVING concluded on the breadth, or tread, of the ſteps, and bigneſs of the rail intended, with the projections and form of the mouldings in *fig.* 2. continue out the front of the ſe-

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Fig. 1.

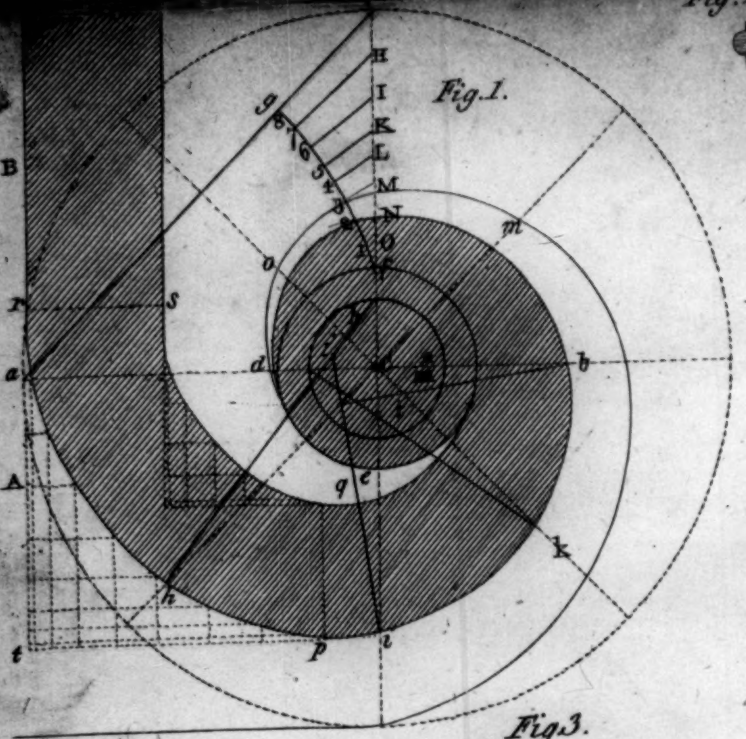


Fig. 2.

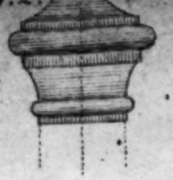


Fig. L.

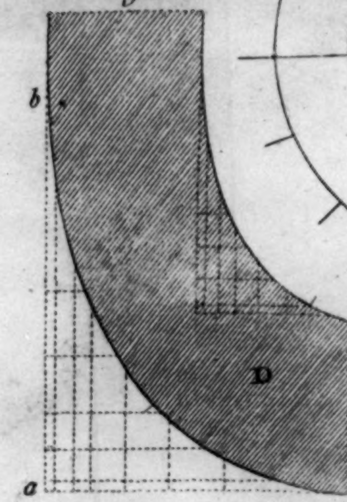


Fig. 8.

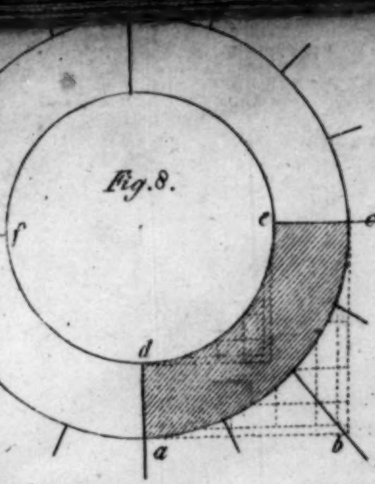


Fig. 11.

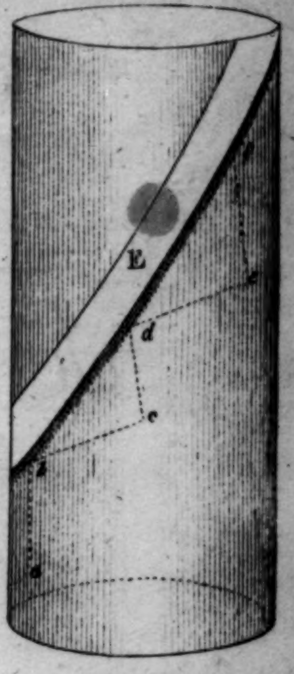
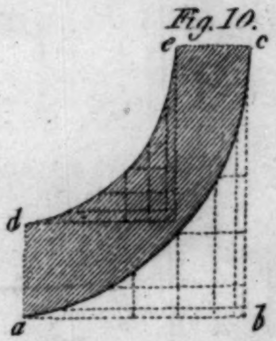


Fig. 10.



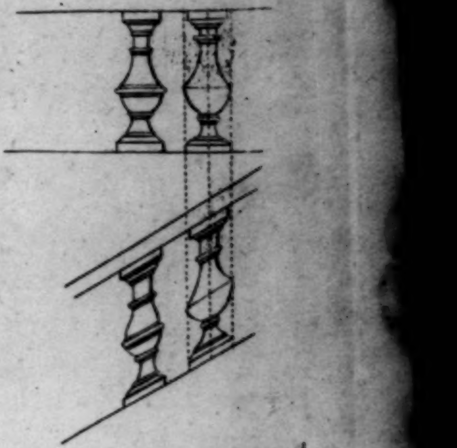


Fig. 6.

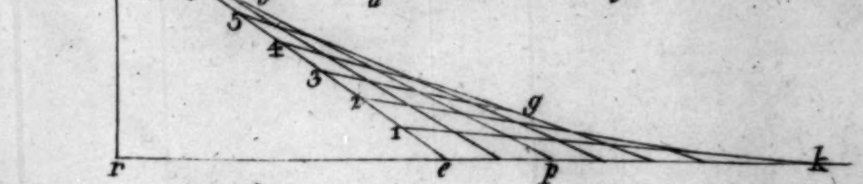


Fig. 3.

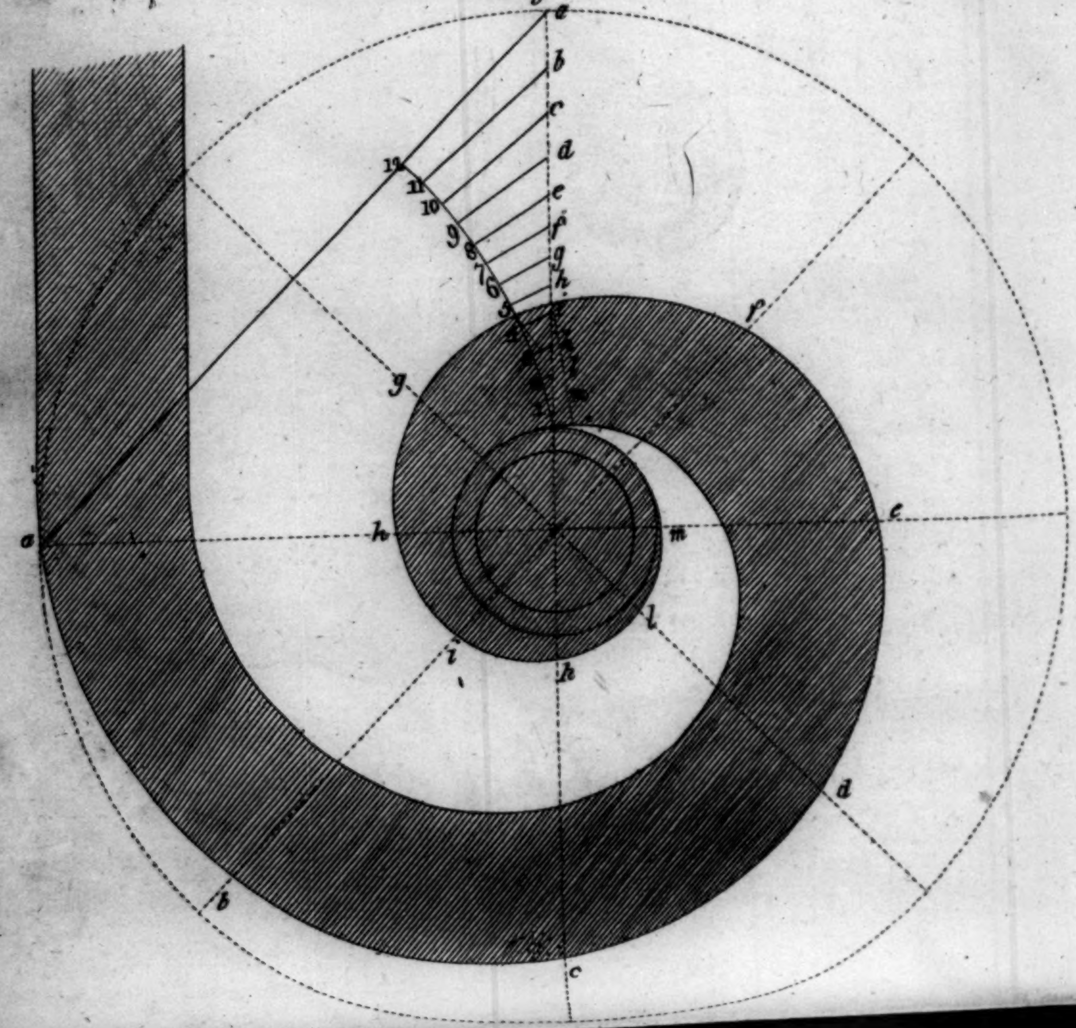


Fig. 5.

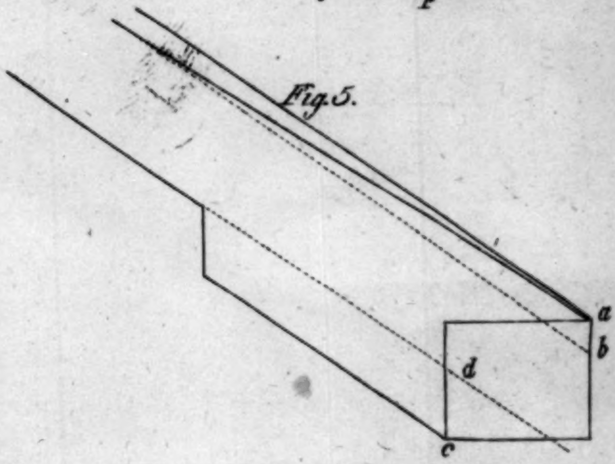


Fig. 9.

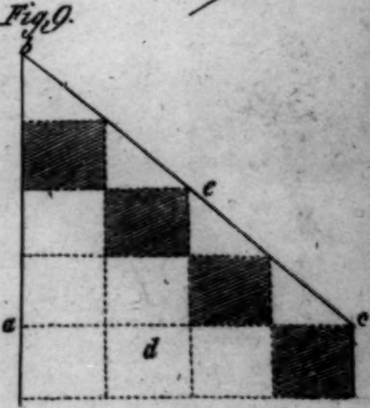
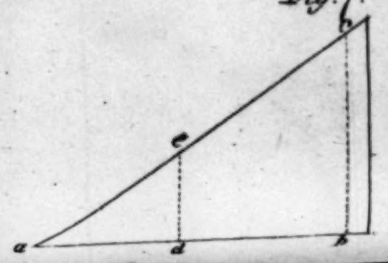


Fig. 7.



cond ſtep between A and B; and on it deſcribe a circle, which ſhall touch the inſide of the rail, and whoſe diameter is equal to the breadth of two ſteps; which divide into eight equal parts. Then, on the ſame centre, deſcribe a circle equal to the bigneſs of the rail, *Fig.* 2.; alſo another circle as much larger as the projection of the mouldings, as *a b c d.*

Draw the diagonal line *e f*, and deſcribe the part of a circle, *a g*, which divide into eight equal parts, and continuing them from the centre *e*, to the line *t h i k l m n o a*, you have the diminiſhing ſcale for the formation of the ſcroll.

Next, ſetting off, within the great circle, the reſpective diſtances *f h*, *f i*, *f k*, *f l*, on each eighth part of the circle, and taking the diſtance from the centre C to *f*, find the centre in the eye, or block, as at *f*, for the firſt eighth part of the ſcroll, then the diſtance C *h* for the next eighth, and ſo on, till you have the ſcroll coming into the block at one revolution of a circle.

Here obſerve, that the inſide ſcroll, though drawn from the ſame centres, muſt not meet on the eighth parts of the great circle, but on a line drawn to each reſpective centre.

If you would have a ſcroll to make a greater revolution, as *fig.* 3. deſcribe a circle whoſe diameter is equal to 3 ſteps, and divide the diminiſhing ſcale into 12 parts, and ſtriking one eighth of the great circle at a time, as before, you have the ſcroll at one revolution and half of a circle.

But requiring it ſtill larger, deſcribe a circle whoſe diameter is equal to the breadth of 4 ſteps, and dividing the diminiſhing ſcale into 16 parts, you have the ſcroll at two revolutions of a circle.

This I think is plain enough by inſpection.

To ſquare the Rail.

A mould muſt be traced out to find a ſweep, which, if applied on the rake, will anſwer to the ground of *r s p q*, as *Fig.* 4.; but obſerve, there will be wood required extraordinary, both on the top of the rail, as at *a b*, in *Fig.* 5, and alſo, at the bottom, as *c d*. For the diſcovering of how much it muſt be, take notice, where the twiſt begins in the Plan, *Fig.* 1. as *r s*; and alſo, that at *k* the twiſt ends. Therefore, let the diſtance from *r* to *k* be divided into a number of equal parts, and transfer them on ſome line, as from *r* to *k*, *Fig.* 6.; then take the diſtance *r t*, and apply it to the pitch-board, which is the riſe and tread of each ſtep, *Fig.* 7. as from *a* to *b*, and raiſe the perpendicular *b c;* then, in *Fig.* 6, from the end of the line *r*, make the triangle *r e d*, equal in all reſpects to that of *a b c*, *Fig.* 7.

Laſtly, Dividing from *e* to *d*, and from *e* to *k*, into eight equal parts, and drawing ſtrait lines from each diviſion, you will form a curve, ſhewing how much wood is required on the back of the rail, as *p q*, which transfer from *b* to *a*, in *Fig.* 5, and there deſcribe the bigneſs of the rail, which ſhews the deficiency of wood, as above-mentioned.

The other part of the twiſt from *p* to *k*, as alſo, the block, which is level, is cut out of a parallel piece.

For tracing the mould, *fig.* 4. take, in *fig.* 1, from *r* to *t*, and apply it to the pitch-board, *fig.* 7, from *a* to *b*; it gives the hypothenuſe *a c*, which transfer to *fig.* 4, from *a* to *b*; alſo, in *fig.* 1. take from *p* to *q*, and apply it to *fig.* 7, from *a* to *d*; it gives *a e*, which place in *fig.* 4, from *c* to *d*; which done, trace out the raking mould D, by the interſection of lines ſquared from the diviſions of the plan *r p*, and *s q*, *fig.* 1; which is eaſily comprehended by inſpection, and when elevated to the proper pitch, will ſtand exactly over the ſaid plan.

So that this mould being applied on the top of the rail, and the mould, *fig.* 6, on the inſide thereof, in their reſpective places, and marking them by, and cutting away the ſuperfluous wood, you have two ſides of the rail ſquared, and the other two are found by gauging from them.

This method of forming the raking mould, will ſerve for all twiſt rails whatſoever, with due application, as ſhall be ſhewn in another example of a ſtair-caſe, having a circular well-hole.

Fig. 8. *Is the Plan of a circular Rail having* 16 *Steps in the whole Circumference; but, here it is propoſed to find the Raking mould to a fourth Part thereof, or four Steps, it being to a ſmall Scale.*

The plan being laid down, as *a c d e*, *fig.* 8, divide the outer circle into a number of equal parts, ſo as to transfer them on ſome line, as *a c*, *fig.* 9; and ſetting up the riſe of four ſteps; as *a b*, gives the pitch-board due to them all. Then taking *b c*, in *fig.* 8, applied to the pitch-board, *fig.* 9, from *c* to *d*; it gives *c e*, which transfer to *fig.* 10, from *b* to *c*: Alſo, from *fig.* 8, take *a d*, placed in *fig.* 9, from *c* to *g*, gives *c f*, which tranſfer to *fig.* 10, from *a* to *d;* and there, tracing, as before taught, you will form the raking mould required.

Some able workmen have another method of forming this rail.

Firſt, They make a cylinder equal to the whole well-hole *f e*, in *fig.* 8, or part thereof, either ſolid, (if the well-hole be ſmall,) or, if large, by faſtening boards together upright in the exact form of the plan.

Then they proceed to ſet on the ſaid cylinder, as *fig.* 11, the height and breadth of each ſtep, as *a b c d e f*, &c. and to the extreme points, *b d f*, they bend round ſeveral thin pieces of the breadth of *c f*, in *fig.* 9, and being glued, or otherwiſe faſtened together, till they make the thickneſs of the rail, as E: We ſay, theſe, when taken off from the cylinder, will be the rail, and exactly ſquared to the right twiſt.

This is a very ſafe and ſure method, though not very frequently made uſe of.

Either of theſe ways will ſerve, ſhould the well-hole be an ellipſis, or any other figure, for its plan.

CHAP. XVI.

Of ROOFS. PLATE XXVII.

THE firſt thing to be conſidered in roofs, is the covering wherewith the building is to be incloſed, as lead pan-tiles, ſlates, or plain tiles; they each require more pitch, or ſlope, than the other; for which obſerve the following rules:

Fig. 1. Is a proper pitch, for covering with lead. To find the perpendicular height, divide the breadth of the building into four equal parts, and ſub-divide the part betwixt one and two, or two and three, into four equal parts.

Then take half the building, and one of thoſe parts for the length of the rafter; which ſaid length being uſed as a radius, deſcribe the arches interſecting in A.

Fig. 2. Is a proper pitch for covering with pan-tiles and ſlates. To find the perpendicular height, divide the building into four parts: Again, divide one of thoſe parts into two, and take half the building, and one of thoſe parts for the length of the rafter, which will interſect in B the perpendicular height.

Fig. 3. Is a proper pitch for covering with plain tiles. To find the perpendicular height, divide the breadth of the building alſo into four parts, and take three of thoſe parts for the length of the rafter, which will interſect in C the perpendicular height; this is called *true*, or *common pitch*, it being moſt in uſe.

In theſe three examples are alſo ſhewn the manner of framing timbers on the beams, which ſerve to truſs and ſtrengthen the principal rafters, which ought always to be carefully obſerved.

Fig. 4. Is a roof partly flat, of a different kind to all the others; it riſes $\frac{1}{4}$ of the ſpan, and by ſcarfing, or piecing the beams together, in the manner of the beam C, it will be capable of ſpanning any breadth whatſoever; and, if room ſhould be wanting in the middle of the roof, the braces B and C may be omitted.

Fig. 5. Is a flat roof, having but $\frac{1}{8}$ of its ſpan for its perpendicular height, and muſt be covered with lead, and the rafters thus jogled into the beams, which are made camber, will be very ſubſtantial.

Fig. 6. Is another flat roof riſing ſomewhat higher, the perpendicular being $\frac{1}{6}$ of its ſpan, and with thoſe truſſes will be exceeding ſtrong. Alſo here is ſhewn how drips may be made to walk upon, as A.

Fig. 7. Is for a curve ceiling: And although the beam or tye be hereby interrupted, yet, by this manner of truſſing, this roof will be exceeding ſtrong.

Fig. 8. Is a roof ſo formed, that, if the foregoing pitch for plain tiles is judged to be too lofty, then, by this method of having a gutter in the middle, one-third of the height of the roof is taken off, as is plain by the diviſions on the plate; and theſe are called M *Roofs*, from their likeneſs of an M.

Fig. 9. Is a roof that ſpans beyond the walls; and of this ſort are the roofs of Covent-Garden and Horſly-down churches, which are very proper, by reaſon they give a covering to people under the eaves, as well as to the building itſelf.

Figures 10, 11, and 12, are curvilineal roofs, which are much in uſe for ſummer-houſes, temples, &c.; they are ſupported by pillars at *a a*.

c c c Andw Cunningham

BRITISH MUSEUM 30 JUN 67

Fig. 1.

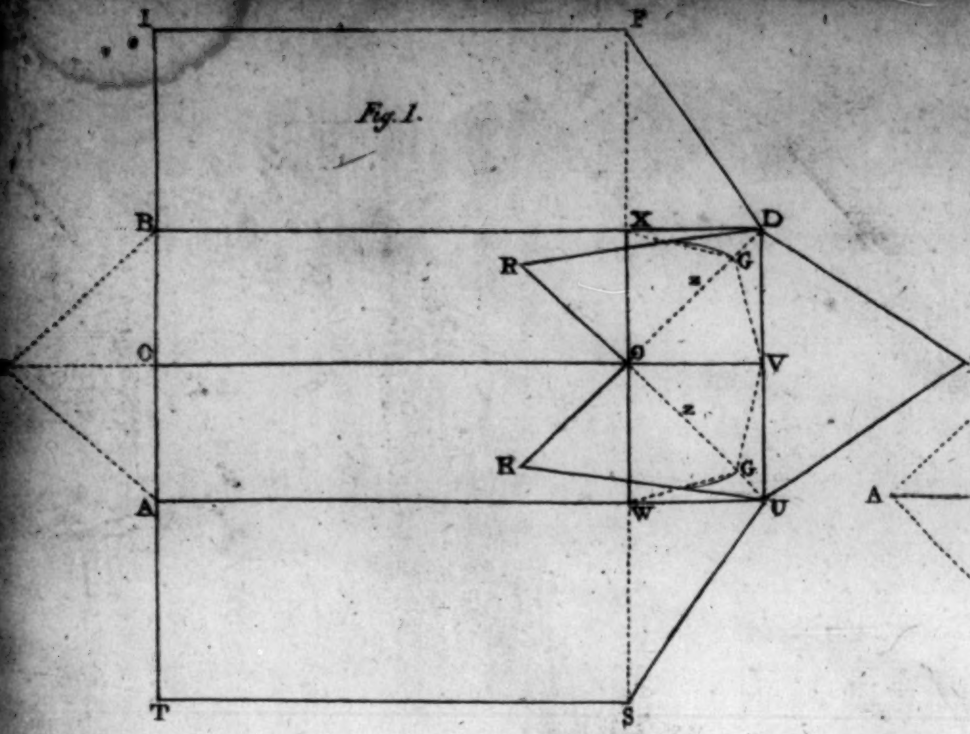


Fig. 2.

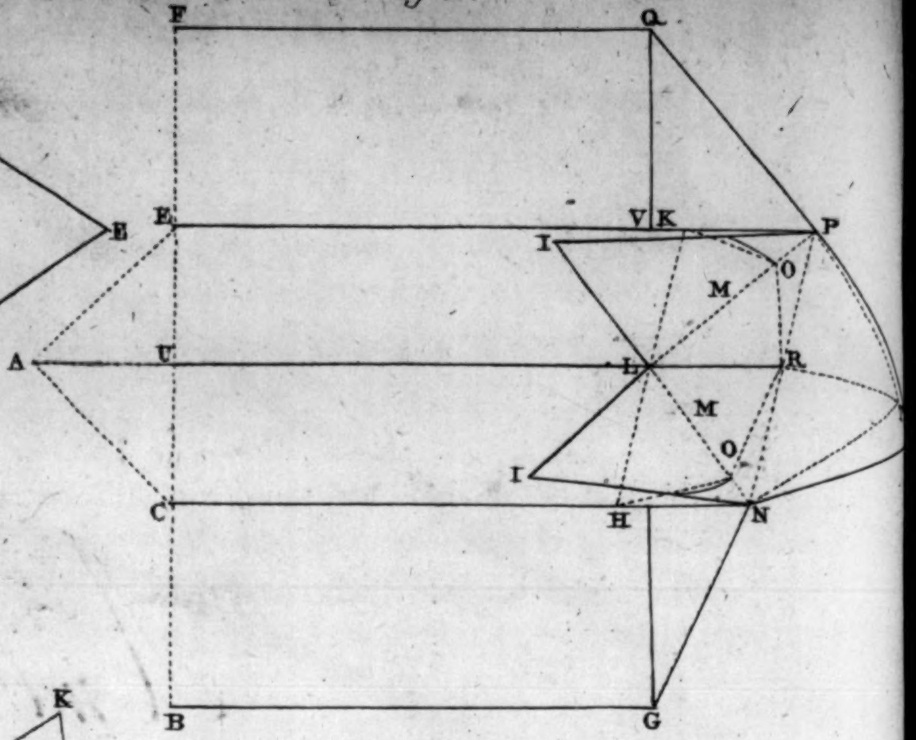


Fig. 4.

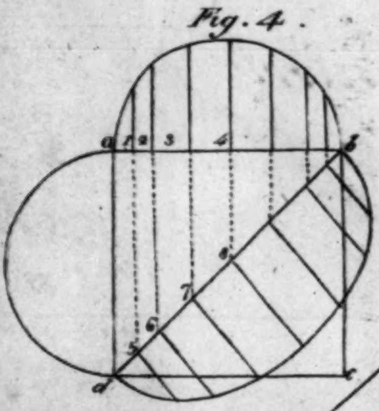


Fig. 3.

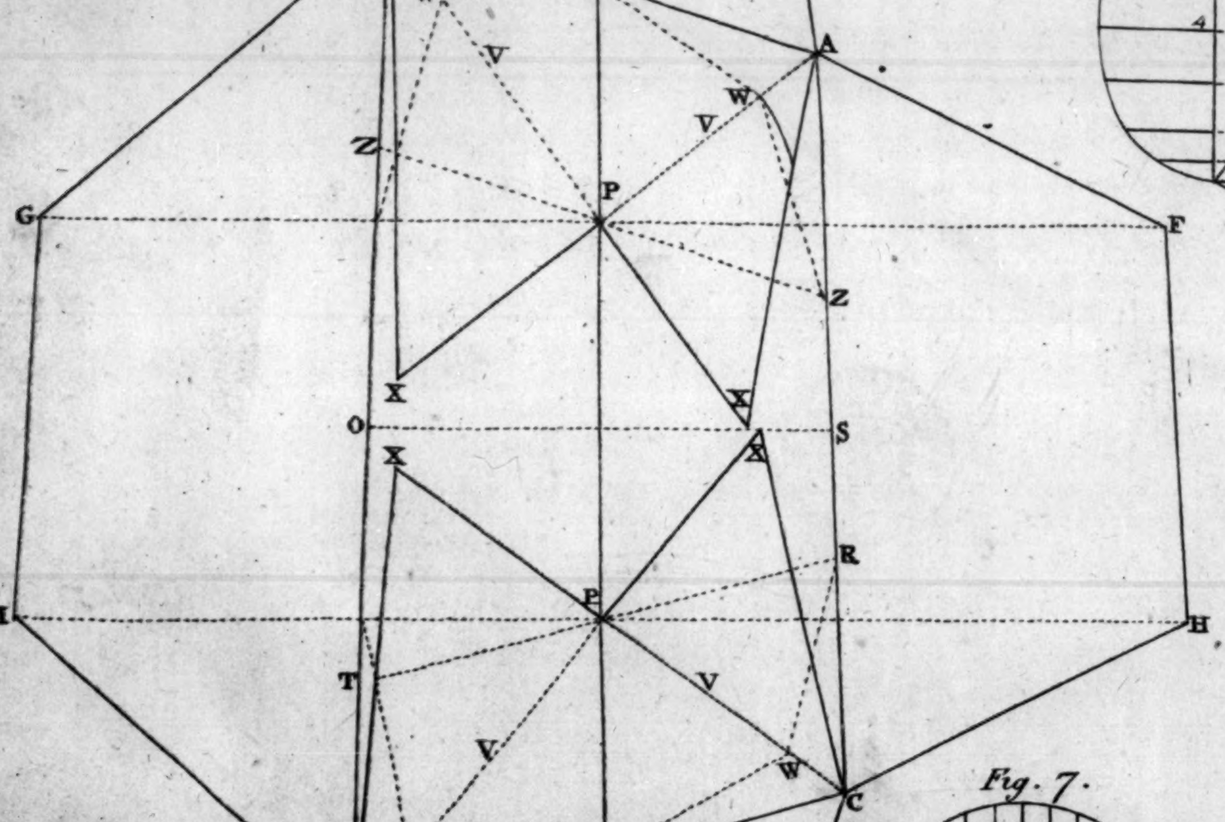


Fig. 5.

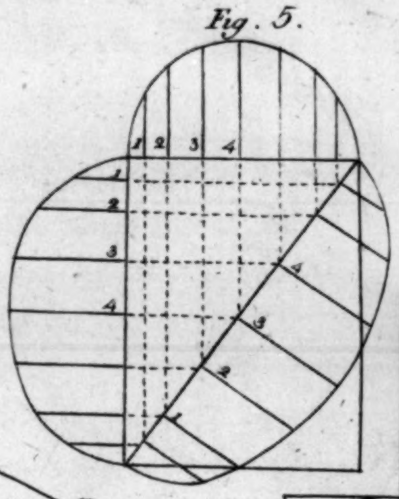


Fig. 6.

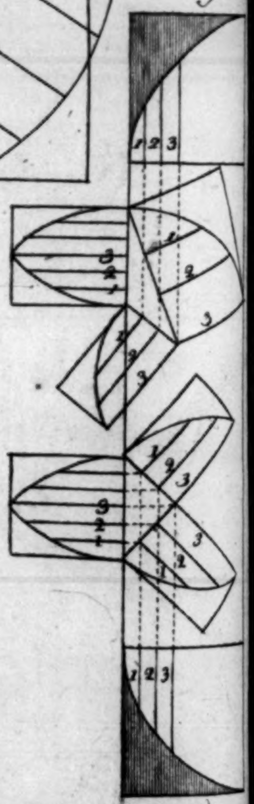


Fig. 7.

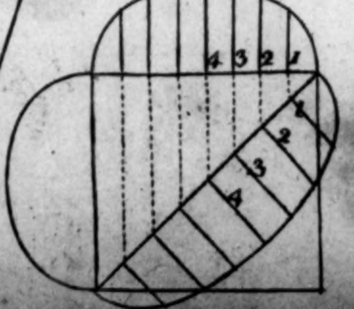
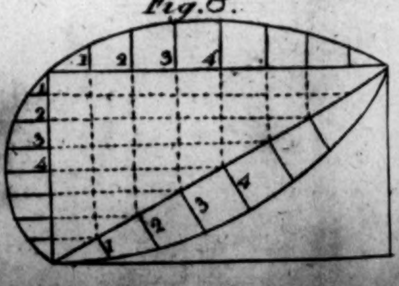


Fig. 8.



C H A P. XVII.

Of the HIP-ROOF. Plate XXIX. *Fig.* 1.

Instructions to find the length and back of the hip-rafter, ſo as it may anſwer the ſide and the end of the perpendicular line of the gable-end, the two ſkirts, the ſide of the roof, whether in plano, or lying in ledgment, with the hip and gable-end; the diagonal and perpendicular lines being laid down proportional to any breadth or length.

EXAMPLE. Fig. 1.

Let ABCD be the ſides and ends of the ſaid roof, one end to be hipped, and the other a gable-end; draw the lines ABCD, the breadth and length of that roof; then draw the gable-end AHB, whoſe ſides AH, and BH, are equal in length to ¾ of the width of the houſe, or true pitch; then draw the perpendicular line OH, the height of the gable-end, which line is of general uſe to level the ridge of all roofs; and if the other end be hipped, as in the deſign CDE, then it ſerves to find the length and back of the hip, ſo that it may anſwer both ſides and ends of the roof, always obſerving that the middle of the breadth of the houſe is as OV; then draw the line SWXF through the centre Q, which will make right angles to the line OV, both in ſquare and bevel houſes; and the diſtance WS and XF are each equal to the length of the rafters AH, or BH; then extend the line AB on both ſides to T and I, and to the ſame length alſo; ſo will IF, and ST, make the length of the ridge QO, and SC, and DF, the two ſkirts.

To find the Length of the HIP.

Draw the diagonal lines C Q and Q D, over which the hip is to hang when in its due place; then take the perpendicular line O H, and place it from the point Q to the point R R, the one perpendicular to the diagonal, or baſe line C Q, and the other to Q D; ſo is Q R, and Q R, the pitch of the hip equal to the gable-end O H, and, when erected, will hang perpendicular to the point Q; then take the lines C R, and R D, placing them from C to E, and from D to E, and it gives the length of the hip C E D; and when laid to their pitch will all meet perpendicular to the point I.

To find the Back of the Hip, ſo that it may anſwer both Sides i l Ends of the Roof, whether Square or Bevel.

Lay a ruler from the point W to the point V, and from the point V to X, and mark where it cuts the diagonal lines C Q, and Q D, at *z z*; then ſet one foot of the compaſſes in the point *z*, extend the other foot to the neareſt diſtance on the hip-lines C R, and D R, and with that diſtance mark the points G G, upon the ſame diagonal lines; then draw the pricked lines W G V, and V G X, which makes the back of the hip for the two corners of that roof.

CHAP. XVIII.

Of the Roof Bevel at one End, and Square at the other; the Gable-End Square, the Bevel-End Hipped. Fig. 2. PLATE XXIX.

SUPPOSE the breadth of the houſe 20 foot, the length more on one ſide than the other, as in the Deſign CNEP, then draw the gable-end CAE, whoſe ſides from C to A, and from A to E, is ¾ of the breadth of the houſe, or is the length of the principal rafters; then draw the perpendicular AD, the height of the roof from the floor; and if kneed, then from the top of the knee.

The ſides of the roof BGFQ, to be drawn as is deſcribed in the foregoing deſign.

Divide the breadth of the houſe into two equal parts, and draw the line DLR; then take the diſtance LV, which is the half breadth of the houſe, and make it parallel to NRB, as HLK, and L will be the point whoſe perpendiculars IL will meet the principal rafters and hips.

To find the Length of each Hip diſtinct from the other; and, firſt, of the longeſt Hips.

Draw the diagonal line PL, and take the height of the gable-end DA, and place it perpendicular to PL at I; ſo have you the height of the roof perpendicular from PL, equal to DA, the gable-end; and the line PI will be the length of the hip rafter, which will be equal to PQ, the ſkirt for that ſide of the hip, and SP, the ſide of that hipped end.

To find the Back of the longeſt Hip IP.

Lay the ruler from the point K to R, and mark where it cuts the diagonal line at M; then ſet one foot of the compaſſes in the point M, and extend the other foot till it touches the line IP at the neareſt diſtance; then make it touch the diagonal line at O;

then draw the lines K O, O R, which is the back of the hip for that corner of the roof.

To find the ſhorteſt Hip IN,

Is all the ſame as to find the length of the longeſt hip; and the backing of the ſhorteſt hip, is alſo found by the ſame method; as is already taught, and needs no other explanation.

N. B. This rule ſerves for all bevel-roofs, let the pitch or ſlope be what it will.

C H A P. XIX.

Of a ROOF BEVEL *at both Ends, and broader at one End than the other.* PLAEE XXIX. *Fig.* 3.

SUPPOSE A B C D the length and breadth of the houſe, and L M N the length of the rafters, or pitch between the wideſt and narroweſt end, about the middle of the houſe, to ſtand over the pricked line S O. K, K, are the points of the two hip-ends, which, when brought to their due place, will be perpendicular to P and P, and will meet the ſides F H, G I, over the ſame points P and P. The points X X X X are the perpendiculars and length of the hips from A B C D; the points W W W W ſhew the back of the hips, or hip-mould due to each corner; and V V V V are the points to find out the points W W W W for each back. R T, Z Z, are the lines repreſenting half the breadth of the houſe parallel to each end; and Y Y repreſents the middle of the houſe.

Notwithſtanding the bevel-ends, you may place the beams for your principal rafters to ſtand on a ſquare, or ſo near a ſquare as may be, or between both; as from the ends of the pricked lines **FG, HI,** bringing the outſide of them ſtrait under P, which will be more handſome for the houſe within ſide, although it bevels outward.

CHAP. XX.

Of Architectonical Axioms *and* Analogies.

I. *Of DOORS.*

THAT the height of all doors be double their breadth. That doors, in general, be proportionable to the magnitude of the rooms.

That the breadth of inner doors be never leſs than two feet and a half, nor more than ſix foot: That the doors of the ſecond and third ſtories be placed exactly over the doors of the firſt: That an arch of brick or ſtone be turned over every door to diſcharge the weight that preſſes upon them, which oftentimes ruins the ſtructure.

II. *Of WINDOWS.*

That the bigneſs and number of windows be proportional to the rooms they are to enlighten, and their height double their breadth, with the addition of $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{5}$ part, as ſhall be found neceſſary: that the height of the windows in the ſecond ſtory be $\frac{1}{3}$ $\frac{1}{2}$ of the firſt, and the height of the Attic, or third ſtory, $\frac{3}{4}$ of the ſecond ſtory: That windows be not placed too near the angles of any building, for thereby the ſtructure will be weakened.

That over every window be turned an arch to diſcharge the weight that lyes over them.

That no girders be laid over any door or window, but always on the moſt ſubſtantial part of the brick or ſtone piers, &c. that ſolid may reſt upon ſolid.

III. *Of GATES.*

That the breadth of principal gates of entrance be never leſs than ſeven foot and a half, nor more than twelve feet.

That the height of principal gates, or entrance, be never leſs than once and a half their breadth, nor more than twice, which is the beſt proportion.

IV. *Of HALLS.*

That the length of halls be not leſs than twice their breadth, nor more than three times.

That the height of halls, whoſe ceilings are flat, be not leſs than $\frac{2}{3}$ of their breadth, or more than $\frac{3}{4}$ of the length.

That the height of halls, whoſe ceilings are arched or coved, be not leſs than $\frac{5}{6}$, nor more than $\frac{11}{12}$ of their breadth.

V. *Of GALLERIES.*

That their ſight be toward the north, on account that the north light is the beſt for paintings, pictures, &c.

That the breadth of galleries be not leſs than 16 foot, nor more than 24.

That the length of galleries be not leſs than five times their breadth, nor more than eight at moſt.

That the height of galleries be equal to their breadth, if with flat ceilings; but if arched, or coved, $\frac{1}{5}$, $\frac{1}{4}$, or $\frac{1}{3}$ of the breadth may be ſuperadded.

VI. *Of ANTICHAMBERS.*

That the length of all antichambers be one fourth more than their breadth.

That the breadth of all antichambers be proportionable to the whole ſtructure: That the height of antichambers be not leſs than $\frac{2}{3}$ of the breadth, or more than $\frac{3}{4}$ of the length, when the ceiling is flat; and when arched or coved, not leſs than $\frac{5}{6}$, nor more than $\frac{11}{12}$ of their breadth.

VII. *Of CHAMBERS.*

That all principal chambers of delight be placed towards the beſt proſpects of the country, and, if poſſible, to the eaſt.

That the length of chambers never exceed the breadth, and $\frac{1}{5}$ of the breadth; therefore the length may be the breadth exactly, or the breadth and $\frac{1}{8}$, $\frac{1}{7}$, $\frac{1}{6}$, or $\frac{1}{5}$.

That the height of all chambers of the firſt ſtory, whoſe ceilings are flat, be not leſs than $\frac{2}{3}$ of the breadth, or more than $\frac{3}{4}$ of the length.

That the altitude of the chambers of the ſecond floor be $\frac{11}{12}$ of the firſt ſtory.

That the altitude of the chambers in the third floor be $\frac{3}{4}$ of the ſecond.

VIII. *Of FLOORS.*

That the floor of every ſtory in a building be truly level throughout, ſo as to paſs out of one room into another, without going up or down ſtairs, as is common in many buildings.

That the height of the level of the firſt or ground-floor be never leſs than one foot, nor more than four feet.

IX. *Of CHIMNIES.*

1. *Of Hall Chimnies.*

That the proportion of hall chimnies be as follows; viz. Their diſtance between the jaumbs from ſix to eight feet; their height from four feet and a half to five feet; their projection from two feet and a half to three feet at moſt; the breadth of the jaumbs from nine to twenty inches, or more, as occaſion may require, according to the order that the chimney is adorned with.

2. *Of Chamber Chimnies.*

The proportions of chamber chimnies are as follows; viz. Their breadth from five to ſeven feet; their height four feet and a half, and projecture two feet and a half.

3. *Of Chimnies in Studies*, &c.

The proportions of chimnies in ſtudies are as follow; viz. Their breadth from four to five feet at moſt; their height four feet, and projecture two feet and a half.

That the funnels of chamber-chimnies, or ſtudies, be not narrower than ten inches, or wider than fifteen, which is a good ſize for kitchen-chimnies.

X. *Of the Funnels of Chimnies*.

That the funnels of chimnies be carried a ſufficient height above the ridge, that winds may have the leſs power to beat the ſmoke back.

That the funnels of chimnies be not wide, becauſe thereby the wind may drive down the ſmoke into the room; or too narrow, ſo that it cannot have a free paſſage out.

That the funnels of chimnies be truly perpendicular, otherwiſe the ſmoke cannot ſo freely paſs.

That no timber, joiſt, &c. be laid nearer the jaumbs than one foot: That no trimming joiſts be laid nearer than ſix inches to the back of any chimney.

That the funnels of all chimnies have not any timber, as girders, joiſts, &c. laid therein, leſt, ſome time or other, they chance to take fire.

XI. *Of Joiſts, Rafters and Girders.*

That the greateſt diſtance that joiſts, or rafters, are laid from each other, do not exceed 12 inches; and quarters in partitions 14 inches aſunder: That no joiſt bear at a greater length than twelve feet; or ſingle rafters more than ten feet.

That the length of joiſts laid in the wall be not leſs than ſeven inches, and no girder leſs than nine inches.

XII. *Of* MATERIALS, &c.

1. That money and materials be always ready from the beginning, or laying of the foundation, to the turning of the key, when the whole is completed.

2. That great care be taken in the goodneſs of foundations, and that they be truly level.

3. That the thickneſs of all foundations be double to the inſiſtent wall.

4. That the moſt heavy materials be employed in the foundation.

5. That all walls diminiſh in thickneſs, according to the nature and height of the ſtructure.

6. That every wall be perpendicular.

7. That ſuch bricks as are not well burnt, be not uſed in any building.

8. That the depth of all fabrics in the ground, that have cellars, vaults, &c. be $\frac{1}{7}$ of the whole height; and thoſe that have no cellars to be $\frac{1}{6}$ of the height.

9. That the kitchen be ſpacious and light, and as remote from the parlour as poſſible, and to be under ground; as alſo the pantry, bake-houſe, ſtill-room, buttery, dairy, and ſervants offices in general.

10. That cornices do not project too far out from the building, whereby the windows will be darkened.

11. That of all kinds of arches none are ſo ſtrong as the semicircle.

12. That the depth of all ruſtics be never more than one foot, nor leſs than nine inches.

13. That the thickneſs of pilaſters, of doors and windows, be not more than $\frac{1}{5}$ of their aperture or breadth, nor leſs than $\frac{1}{6}$.

14. That the projecture of pilaſters in general be $\frac{1}{6}$ of their thickneſs.

15. That the roofs of all buildings be not too heavy, or too light, and that interiour walls ſupport part of the ſame.

16. That convenient ciſterns be well placed, plentifully to furniſh every office with water; and that proper machines be made to raiſe the ſame therein.

Laſtly, That convenient drains, to carry away ſoil, &c. be well contrived, and ſecretly placed, with vents to diſcharge the noiſome vapours that uſually ariſe from them.

CHAP. XXI.

Deſcription and Uſe of the TABLE *for finding the Diameter, in Proportion to any height of* Columns *or* Pilaſters, *throughout all the* Five Orders *in* ARCHITECTURE. PLATE XXX.

THE firſt column towards the left hand, is the height of the column or pilaſter, in feet, and inches, from 5 to 20 foot high, in a gradual aſcent of 3 inches. On the top of the table is writ the name of the Five Orders, viz. Tuſcan, Doric, Ionic, Corinthian, and Compoſite, and ſhews how many heads in the table go to each order, which is four heads to each order; and right under Tuſcan, Doric, &c. is writ the variety of caſes that the diameter is calculated to, viz. to the column alone; the column and entablature; column, entablature, and pedeſtal; and the column and pedeſtal only.

Theſe are all the variety of caſes that can poſſibly happen in practice. In each column there are two rows of figures; the firſt of which are inches, and the other ſo many 16ths of an inch.

EXAMP. Let it be required to find the diameter for erecting the Doric column with its entablature, to a limited height of 8 foot 6 inches. Seek in the firſt column for 8 foot 6 inches; alſo, on the top of the table, under Doric, for column and entablature, and, in the angle of meeting you will find there ſet down 10,3, which ſignifies 10 inches and 3 ſixteenths of an inch; which is the exact diameter in proportion to the limited height required.

Proceed in the ſame manner for any other order, in any caſe whatever.

INSPECTIONAL TABLE

Plate XXX.

The Height in Ft. & In.		Tuscan				Doric				Ionic				Corinthian				Composite			
		Column	Column & Entablature	Col. Enta. & Pedestal	Colm. & Pedestal	Column	Column & Entablature	Col. Enta. & Pedestal	Colm. & Pedestal	Column	Column & Entablature	Col. Enta. & Pedestal	Colm. & Pedestal	Column	Column & Entablature	Col. Enta. & Pedestal	Colm. & Pedestal	Column	Column & Entablature	Col. Enta. & Pedestal	Colm. & Pedestal
	I.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.	I. P.
5	0	8 . 9	6 . 13	5 . 9	6 . 10	7 . 8	6 . 0	4 . 14	5 . 13	6 . 10	5 . 9	4 . 7	5 . 2	6 . 5	5 . 3	4 . 4	4 . 14	6 . 0	5 . 0	4 . 0	4 . 10
	3	9 . 0	7 . 3	5 . 13	7 . 0	7 . 14	6 . 4	5 . 1	6 . 1	7 . 0	5 . 13	4 . 10	5 . 6	6 . 10	5 . 7	4 . 8	5 . 2	6 . 4	5 . 4	4 . 3	4 . 13
	6	9 . 6	7 . 9	6 . 2	7 . 5	8 . 4	6 . 9	5 . 5	6 . 6	7 . 5	6 . 2	4 . 14	5 . 10	6 . 15	5 . 12	4 . 11	5 . 6	6 . 9	5 . 8	4 . 6	5 . 7
	9	9 . 13	7 . 14	6 . 6	7 . 10	8 . 10	6 . 14	5 . 9	6 . 11	7 . 10	6 . 6	5 . 1	5 . 14	7 . 4	6 . 0	4 . 14	5 . 10	6 . 14	5 . 12	4 . 9	5 . 5
6	0	10 . 4	8 . 4	6 . 11	8 . 0	9 . 0	7 . 3	5 . 13	6 . 15	8 . 0	6 . 11	5 . 5	6 . 3	7 . 9	6 . 4	5 . 1	5 . 14	7 . 3	6 . 0	4 . 13	5 . 9
	3	10 . 11	8 . 9	6 . 15	8 . 5	9 . 6	7 . 8	6 . 1	7 . 4	8 . 5	6 . 15	5 . 8	6 . 7	7 . 14	6 . 9	5 . 5	6 . 2	7 . 8	6 . 4	5 . 0	5 . 12
	6	11 . 2	8 . 15	7 . 4	8 . 10	9 . 12	7 . 12	6 . 5	7 . 9	8 . 10	7 . 4	4 . 12	6 . 11	8 . 3	6 . 13	5 . 8	6 . 6	7 . 12	6 . 8	5 . 3	6 . 0
	9	11 . 9	9 . 4	7 . 9	9 . 0	10 . 2	8 . 1	6 . 9	7 . 13	9 . 0	7 . 9	6 . 0	6 . 15	8 . 8	7 . 1	5 . 11	6 . 10	8 . 1	6 . 12	5 . 6	6 . 3
7	0	12 . 0	9 . 9	7 . 13	9 . 5	10 . 8	8 . 6	6 . 13	8 . 2	9 . 5	7 . 13	6 . 3	7 . 3	8 . 13	7 . 5	5 . 15	6 . 14	8 . 6	7 . 0	5 . 9	6 . 7
	3	12 . 6	9 . 15	8 . 2	9 . 10	10 . 14	8 . 11	7 . 0	8 . 7	9 . 10	8 . 2	6 . 7	7 . 7	9 . 2	7 . 10	6 . 2	7 . 1	8 . 11	7 . 4	5 . 13	6 . 11
	6	12 . 13	10 . 5	8 . 6	10 . 0	11 . 4	[illegible] . 0	7 . 3	8 . 11	10 . 0	8 . 6	6 . 10	7 . 11	9 . 7	7 . 14	6 . 6	7 . 5	9 . 0	7 . 8	6 . 0	6 . 14
	9	13 . 4	10 . 10	8 . 11	10 . 5	11 . 10	9 . 4	7 . 8	9 . 0	10 . 5	8 . 11	6 . 14	7 . 15	9 . 12	8 . 2	6 . 9	7 . 9	9 . 4	7 . 12	6 . 3	7 . 2
8	0	13 . 11	10 . 15	8 . 15	10 . 10	12 . 0	9 . 9	7 . 12	9 . 4	10 . 10	8 . 15	7 . 1	8 . 3	10 . 1	8 . 6	6 . 12	7 . 13	9 . 9	8 . 0	6 . 6	7 . 6
	3	14 . 2	11 . 4	9 . 3	11 . 0	12 . 6	9 . 14	8 . 0	9 . 9	11 . 0	9 . 3	7 . 5	8 . 7	10 . 6	8 . 11	7 . 0	8 . 1	9 . 14	8 . 4	6 . 9	7 . 10
	6	14 . 9	11 . 10	9 . 8	11 . 5	12 . 12	10 . 3	8 . 4	9 . 13	11 . 5	9 . 8	7 . 8	8 . 11	10 . 11	8 . 15	7 . 3	8 . 5	10 . 3	8 . 8	6 . 13	7 . 13
	9	15 . 0	12 . 0	9 . 12	11 . 10	13 . 2	10 . 8	8 . 8	10 . 2	11 . 10	9 . 12	7 . 12	8 . 15	1 . 0	9 . 3	7 . 7	8 . 9	10 . 8	8 . 12	7 . 0	7 . 1
9	0	15 . 6	12 . 5	10 . 0	12 . 0	13 . 8	10 . 12	8 . 12	10 . 7	12 . 0	10 . 3	8 . 0	9 . 4	11 . 5	9 . 7	7 . 10	8 . 13	10 . 12	9 . 0	7 . 3	8 . 5
	3	15 . 13	12 . 10	10 . 4	12 . 5	13 . 14	11 . 7	9 . 0	10 . 11	12 . 5	10 . 4	8 . 3	9 . 8	11 . 10	9 . 11	7 . 13	9 . 1	11 . 7	9 . 4	7 . 6	8 . 9
	6	16 . 4	13 . 0	10 . 9	12 . 10	14 . 4	11 . 6	9 . 4	11 . 0	12 . 10	10 . 9	8 . 7	9 . 12	12 . 0	9 . 15	8 . 0	9 . 5	11 . 6	9 . 8	7 . 9	8 . 12
	9	16 . 11	13 . 6	10 . 13	13 . 0	14 . 10	11 . 11	9 . 8	11 . 5	13 . 0	10 . 13	8 . 10	10 . 0	12 . 5	10 . 3	8 . 3	9 . 9	11 . 11	9 . 12	7 . 13	9 . 0
10	0	17 . 2	13 . 11	11 . 2	13 . 5	15 . 0	12 . 0	9 . 12	11 . 10	13 . 5	11 . 2	8 . 14	10 . 4	12 . 10	10 . 8	8 . 7	9 . 13	12 . 0	10 . 0	8 . 0	9 . 3
	3	17 . 9	14 . 1	11 . 6	13 . 10	15 . 6	12 . 4	10 . 0	11 . 14	13 . 10	11 . 6	9 . 1	10 . 8	12 . 15	10 . 12	8 . 10	10 . 0	12 . 4	10 . 4	8 . 3	9 . 7
	6	18 . 0	14 . 7	11 . 11	14 . 0	15 . 12	12 . 9	10 . 3	12 . 3	14 . 0	11 . 11	9 . 5	10 . 12	13 . 4	11 . 0	8 . 14	10 . 4	12 . 9	10 . 8	8 . 6	9 . 11
	9	18 . 6	14 . 12	12 . 0	14 . 5	16 . 2	12 . 14	10 . 7	12 . 7	14 . 5	12 . 0	9 . 8	11 . 0	13 . 9	11 . 4	9 . 1	10 . 8	12 . 14	10 . 12	8 . 9	9 . 14
11	0	18 . 13	15 . 1	12 . 4	14 . 10	16 . 8	13 . 3	10 . 11	12 . 12	14 . 10	12 . 4	9 . 2	11 . 5	13 . 14	11 . 9	9 . 5	10 . 12	13 . 3	11 . 0	8 . 13	10 . 14
	3	19 . 14	15 . 7	12 . 9	15 . 0	16 . 14	13 . 8	10 . 15	13 . 0	15 . 0	12 . 9	10 . 0	11 . 9	14 . 3	11 . 13	9 . 8	11 . 0	13 . 8	11 . 4	9 . 0	10 . 5
	6	19 . 11	15 . 13	12 . 14	15 . 5	17 . 4	13 . 12	11 . 3	13 . 5	15 . 5	12 . 13	10 . 3	11 . 13	14 . 8	12 . 1	9 . 11	11 . 4	13 . 12	11 . 8	9 . 3	10 . 10
	9	20 . 2	16 . 2	13 . 2	15 . 10	17 . 10	14 . 1	11 . 7	13 . 10	15 . 10	13 . 2	10 . 7	12 . 4	14 . 13	12 . 5	9 . 15	11 . 8	14 . 1	11 . 12	9 . 6	10 . 13
12	0	20 . 9	16 . 7	13 . 6	16 . 0	18 . 0	14 . 6	11 . 11	13 . 14	16 . 0	13 . 6	10 . 12	12 . 6	15 . 2	12 . 10	10 . 2	11 . 12	14 . 6	12 . 0	9 . 9	11 . 1
	3	21 . 0	16 . 12	13 . 11	16 . 5	18 . 6	14 . 11	11 . 15	14 . 3	16 . 5	13 . 11	10 . 14	12 . 10	15 . 7	12 . 14	10 . 6	12 . 0	14 . 11	12 . 4	9 . 13	11 . 5
	6	21 . 5	17 . 2	13 . 15	16 . 10	18 . 12	15 . 0	12 . 2	14 . 7	16 . 10	13 . 15	11 . 1	12 . 14	15 . 12	13 . 2	10 . 9	12 . 4	15 . 0	12 . 8	10 . 0	11 . 9
	9	21 . 13	17 . 8	14 . 3	17 . 0	19 . 2	15 . 4	12 . 6	14 . 12	17 . 0	14 . 3	11 . 5	13 . 2	16 . 1	13 . 6	10 . 12	12 . 8	15 . 4	12 . 12	10 . 3	11 . 12
13	0	22 . 4	17 . 13	14 . 8	17 . 5	19 . 8	15 . 9	12 . 10	15 . 2	17 . 5	14 . 8	11 . 8	13 . 6	16 . 6	13 . 11	11 . 0	12 . 12	15 . 9	13 . 0	10 . 6	12 . 0
	3	22 . 11	18 . 3	14 . 12	17 . 10	19 . 14	15 . 14	12 . 14	15 . 7	17 . 10	14 . 12	11 . 12	13 . 10	16 . 11	13 . 15	11 . 4	13 . 0	15 . 14	13 . 4	10 . 9	12 . 3
	6	23 . 2	18 . 9	15 . 1	18 . 0	20 . 4	16 . 2	13 . 2	15 . 11	18 . 0	15 . 2	12 . 0	13 . 14	17 . 1	14 . 3	11 . 8	13 . 3	16 . 3	13 . 8	10 . 13	12 . 7
	9	23 . 9	18 . 14	15 . 5	18 . 5	20 . 10	16 . 6	13 . 6	16 . 0	18 . 5	15 . 6	12 . 3	14 . 2	17 . 6	14 . 8	11 . 11	13 . 7	16 . 8	13 . 12	11 . 0	12 . 11
14	0	24 . 0	19 . 4	15 . 10	18 . 10	21 . 0	16 . 12	13 . 10	18 . 4	18 . 10	15 . 11	12 . 7	14 . 6	17 . 11	14 . 12	11 . 14	13 . 11	16 . 12	14 . 0	11 . 3	12 . 14
	3	24 . 6	19 . 9	16 . 0	19 . 0	21 . 6	17 . 1	13 . 14	16 . 9	19 . 0	15 . 15	12 . 10	14 . 10	17 . 15	15 . 0	12 . 0	13 . 15	17 . 1	14 . 4	11 . 6	13 . 2
	6	24 . 13	19 . 15	16 . 4	19 . 5	21 . 12	17 . 6	14 . 2	16 . 13	19 . 5	16 . 3	12 . 14	14 . 14	18 . 5	15 . 3	12 . 4	14 . 2	17 . 6	14 . 8	11 . 9	13 . 6
	9	25 . 4	20 . 4	16 . 9	19 . 10	22 . 2	17 . 11	14 . 6	17 . 2	19 . 10	16 . 8	13 . 1	15 . 2	18 . 10	15 . 7	12 . 8	14 . 6	17 . 11	14 . 12	11 . 13	13 . 10
15	0	25 . 11	20 . 9	16 . 12	20 . 0	22 . 8	18 . 0	14 . 10	17 . 7	20 . 0	16 . 12	13 . 5	15 . 6	18 . 15	15 . 12	12 . 11	14 . 11	18 . 0	15 . 0	12 . 0	13 . 13
	3	26 . 2	20 . 15	17 . 0	20 . 5	22 . 14	18 . 4	14 . 14	17 . 11	20 . 5	17 . 0	13 . 8	15 . 10	19 . 4	16 . 0	12 . 14	14 . 15	18 . 4	15 . 4	12 . 3	14 . 1
	6	26 . 9	21 . 15	17 . 4	20 . 10	23 . 4	18 . 9	15 . 1	18 . 0	20 . 10	17 . 4	13 . 12	15 . 14	19 . 9	16 . 4	13 . 1	15 . 2	18 . 9	15 . 8	12 . 6	14 . 5
	9	2[illegible] . 0	21 . 10	17 . 9	21 . 0	23 . 10	18 . 14	15 . 5	18 . 4	21 . 0	17 . 9	14 . 0	16 . 3	19 . 14	16 . 9	13 . 5	15 . 6	18 . 14	15 . 12	12 . 9	14 . 9
16	0	27 . 6	21 . 15	17 . 14	21 . 5	24 . 0	19 . 3	15 . 9	18 . 9	21 . 5	17 . 13	14 . 3	16 . 7	20 . 3	16 . 13	13 . 8	15 . 10	19 . 3	16 . 0	12 . 13	14 . 12
	3	27 . 13	22 . 4	18 . 2	21 . 10	24 . 6	19 . 8	15 . 13	18 . 13	21 . 10	18 . 2	14 . 6	16 . 11	20 . 8	17 . 1	13 . 11	15 . 14	19 . 8	16 . 4	13 . 0	15 . 0
	6	28 . 4	22 . 10	18 . 6	22 . 0	24 . 12	19 . 12	16 . 0	19 . 2	22 . 0	18 . 6	14 . 10	16 . 15	20 . 13	17 . 5	13 . 15	16 . 2	19 . 12	16 . 8	13 . 3	15 . 3
	9	28 . 11	23 . 0	18 . 11	22 . 5	2 . 2	20 . 1	16 . 4	19 . 7	22 . 5	18 . 10	14 . 14	17 . 4	21 . 2	17 . 10	14 . 12	16 . 6	20 . 1	16 . 12	13 . 6	15
17	0	29 . 2	23 . 5	18 . 15	22 . 10	25 . 8	20 . 6	16 . 8	19 . 11	22 . 10	18 . 15	15 . 1	17 . 8	21 . 7	17 . 14	14 . 6	16 . 10	20 . 6	17 . 0	13 . 9	15 . 11
	3	29 . 9	23 . 10	19 . 3	23 . 0	25 . 14	20 . 11	16 . 12	20 . 0	23 . 0	19 . 3	15 . 5	17 . 12	21 . 12	18 . 1	14 . 9	16 . 14	20 . 11	17 . 4	13 . 13	15 . 14
	6	30 . 0	24 . 0	19 . 8	23 . 5	26 . 4	21 . 0	17 . 0	20 . 5	23 . 5	19 . 8	15 . 8	18 . 0	22 . 1	18 . 5	14 . 13	17 . 2	21 . 0	17 . 8	14 . 0	16 . 2
	9	30 . 6	24 . 6	19 . 12	23 . 10	26 . 10	21 . 4	17 . 4	20 . 10	23 . 10	19 . 12	15 . 12	18 . 4	22 . 6	18 . 10	15 . 0	17 . 6	21 . 4	17 . 12	14 . 3	16 . 6
18	0	30 . 13	24 . 11	20 . 0	24 . 0	27 . 0	21 . 9	17 . 8	20 . 14	24 . 0	20 . 0	16 . 0	18 . 8	22 . 11	18 . 14	15 . 4	17 . 10	21 . 0	18 . 0	14 . 6	16 . 10
	3	31 . 4	25 . 1	20 . 4	24 . 5	27 . 6	21 . 14	17 . 12	21 . 3	24 . 5	20 . 4	16 . 3	18 . 12	23 . 1	19 . 2	15 . 8	17 . 13	21 . 14	18 . 4	14 . 9	16 . 13
	6	31 . 11	25 . 7	20 . 9	20 . 10	27 . 12	22 . 3	18 . 0	21 . 7	24 . 10	20 . 9	16 . 7	19 . 0	23 . 6	19 . 6	15 . 11	18 . 1	22 . 3	18 . 8	14 . 13	17 . 1
	9	32 . 2	25 . 12	20 . 13	25 . 0	28 . 2	22 . 8	18 . 3	21 . 12	25 . 0	20 . 13	16 . 10	19 . 4	23 . 11	19 . 10	15 . 14	18 . 5	22 . 8	18 . 12	15 . 0	17 . 5
19	0	32 . 9	26 . 1	21 . 3	25 . 5	28 . 8	22 . 12	18 . 7	22 . 0	25 . 5	21 . 2	16 . 14	19 . 8	24 . 0	19 . 15	16 . 1	18 . 9	22 . 12	19 . 0	15 . 3	17 . 9
	3	33 . 0	26 . 7	21 . 8	25 . 10	28 . 14	23 . 1	18 . 11	22 . 5	25 . 10	21 . 6	17 . 1	19 . 12	24 . 5	20 . 3	16 . 5	18 . 13	23 . 1	19 . 4	15 . 6	17 . 12
	6	33 . 6	26 . 13	21 . 12	26 . 0	29 . 4	23 . 0	18 . 15	22 . 10	26 . 0	21 . 11	17 . 5	20 . 0	24 . 10	20 . 7	16 . 8	19 . 1	23 . 6	19 . 8	15 . 9	18 . 0
	9	33 . 15	27 . 2	22 . 0	26 . 5	29 . 10	23 . 11	19 . 3	22 . 4	26 . 5	21 . 15	17 . 8	20 . 5	24 . 15	20 . 12	16 . 11	19 . 5	23 . 11	19 . 12	15 . 13	18 . 3
	0	34 . 4	27 . 7	22 . 4	26 . 10	30 . 0	24 . 0	19 . 7	23 . 3	26 . 10	22 . 3	17 . 12	20 . 9	25 . 4	21 . 0	16 . 15	20 . 9	24 . 9	20 . 0	16 . 0	18 . 7

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Note, That if you require the diameter to any height greater or leſs than is in the table, proceed in this manner: If the height is greater than any in the table, ſeek for a diameter to half that height; and, when found, double the diameter, and the product is the diameter ſought.

Again; If the height is leſs than any in the table, ſeek for a diameter double the height, and take half thereof for the diameter ſought, and you have your deſire.

DESCRIPTION *of an* INSPECTIONAL TABLE, *ſhewing the Value of one foot of timber that is ſquared and cut to any Scantling or Size, fit for Building, at any Price* per *Foot, cubical Meaſure.* PLATE XX. *Fig.* 3.

EXPLANATION. In the firſt column, towards the left hand, you have the ſcantling or ſize of one ſide of the piece, and the ſcantling or ſize of the other ſide upon the top of the other columns: the figures in every column, towards the left hand, ſhew the price: Thoſe figures under *s* ſtand for ſhillings, and thoſe under *d* for pence, and thoſe under *p* for ſo many eight parts of a penny.

EXAMP. Suppoſe you would know the price of a foot of ſtuff, whoſe ſides are 7$\frac{1}{2}$ by ſix inches; ſeek in the left hand column of the table for 7$\frac{1}{2}$, and direct your eye in a ſtraight line from thence, until you are right under 6 inches, the ſcantling of the other ſide placed on the top of the column, and, in the angle of meeting, you will find ſet down *7d.* $\frac{4}{8}$*p*; which is 7 pence and four eights of a penny, the price ſought.

N. B. If you want to know the price of a foot of ſtuff, whoſe ſcantling is larger than any in the table, ſeek the price to half that ſcantling; and four times that price is the price ſought. Suppoſe the ſcantling given is 20 by 16, the half is 10 by 8; the price of 10 by 8 is 1 *s.* 1*d.* $\frac{2}{8}$*p*; and four times 1 *s.* 1 *d.* $\frac{2}{8}$*p.* is 4 *s.* 5 *d.* 0 *p.* the price required.

To make this table of univerſal uſe.

If more than two ſhillings, obſerve

$$\text{If your price is}\left\{\begin{array}{c} d. \\ 3 \\ 4 \\ 6 \\ 12 \end{array}\right\}\textit{per}\text{ foot more than 2 }s.\text{ viz.}\left\{\begin{array}{cc} s. & d. \\ 2 & 3 \\ 2 & 4 \\ 2 & 6 \\ 3 & 0 \end{array}\right\}\text{add}\left\{\begin{array}{c} \frac{1}{8} \\ \frac{1}{6} \\ \frac{1}{4} \\ \frac{1}{2} \end{array}\right.$$

EXAMP. What is the value of a foot of timber, 6 inches by 9 inches, at 2 *s.* 3 *d. per* foot, cubic meaſure.

Firſt, We find by the table, that at 2 *s. per* foot, its value is ——— ——— ——— 0 9 0

One eight of which is one penny and one eight of a penny, add 1$\frac{1}{8}$ *d.* ——— ——— ——— 0 1 $\frac{1}{8}$

Equal 10 *d.* half farthing.—This is the value ſought 0 10 $\frac{1}{8}$

If leſs than 2 *s.* obſerve

$$\text{If your price is}\left\{\begin{array}{c} d. \\ 3 \\ 4 \\ 6 \\ 12 \end{array}\right\}\textit{per}\text{ foot leſs than 2 }s.\text{ viz.}\left\{\begin{array}{cc} s. & d. \\ 1 & 9 \\ 1 & 8 \\ 1 & 6 \\ 1 & 0 \end{array}\right\}\text{deduct}\left\{\begin{array}{c} \frac{1}{8} \\ \frac{1}{6} \\ \frac{1}{4} \\ \frac{1}{2} \end{array}\right.$$

Examp. What is the value of a foot of timber 6 inches by 9 inches, at 1 *s.* 8 *d.* *per* foot, cubic meaſure.

	s.	*d.*	*p.*
1ſt, We find by the table, that, at 2*s.* *per* foot, its value is	0	9	0
One fifth of which is $1\frac{1}{2}$, or one penny and $\frac{4}{8}$ of a penny.			
2dly, We deduct that $1\frac{4}{8}$*d.* — —	0	1	4
Equal to $7\frac{1}{2}$*d.*—The value ſought. — —	0	7	4

C H A P. XXII.

General Directions for drawing with Indian Ink.

First, The outlines muſt be carefully delineated of every particular part, with a blacklead pencil; and that done as lightly as poſſible, ſo that the blacklead lines can be eaſily diſcharged. Before you draw the out-lines with ink, rub the blacklead lines gently with crumbs of bread till they are only viſible to yourſelf, which will make the drawing pen make a much clearer line than it poſſibly could do above a blacklead draught. Take care your drawing pen makes a neat line of any thickneſs you require, which is done by whetting it thin in the points, but not ſo ſharp as to cut the paper; rub your ink in a cup with a very little water, only as much as will ſerve you for the time, making it as black as poſſible, not to be thick, for then it will not run in the pen; fill it plentifully with ink, and hold it in your hand as perpendicular to the ſquare as you can, beginning at the lines that is neareſt the head of your papers, draw all the lines that lye in that direction, before you turn the ſquare; be very careful of ſtopping them at the proper places, to avoid ſcraping, as it is impoſſible to lay a ſhade over a place that is ſcraped; when you have all the out-lines drawn with ink, rub all your drawing with bread, ſo as to take off any dirtineſs it may have contracted by the application of the ſquare in drawing the out-lines; for, if any part where there is ſhade to come be any-ways ſullied, the ſhade being laid over it, will confirm it upon the paper, ſo that it will be out of the power of bread to take it out, after the drawing is completed.

The *firſt* thing to be obſerved in ſhadowing, is to ſuppoſe a point from whence the light proceeds, ſo that you may be in leſs danger of making the ſhades contradict one another; all the parts of an elevation muſt be ſhaded lighter in proportion as they approach the eye; all the projecting parts, ſuch as pilaſters, ruſticks, cornices, &c. throws an abrupt ſhade upon the wall, in proportion as they project from it; every part of an elevation ſhould be covered with a tint of ſhade, however light, if it ſhould only be a degree darker than the paper on which it is drawn. The ſhadowing of round objects, ſuch as columns, &c. is only to be learned by practice; in ſuch you uſe two pencils, one to lay on the tint of ink, and the other clean to ſoften off the ſhade with pure water.

If you have four or more different degrees of ſhade in your piece, which you muſt have made up in ſeparate cups, ſo that you can perform any of the ſhades at once. A very light tint will make a dark ſhade, if it is repeatedly laid over the ſame place; this is a tedious way, though the beſt, as it makes a much ſofter ſhade than that which is done at once; however, you muſt let the firſt tint always dry before you come over it again; And ſo the ſecond before you lay it over a third time: It would be very much for the advantage of ſhadowing, that the different

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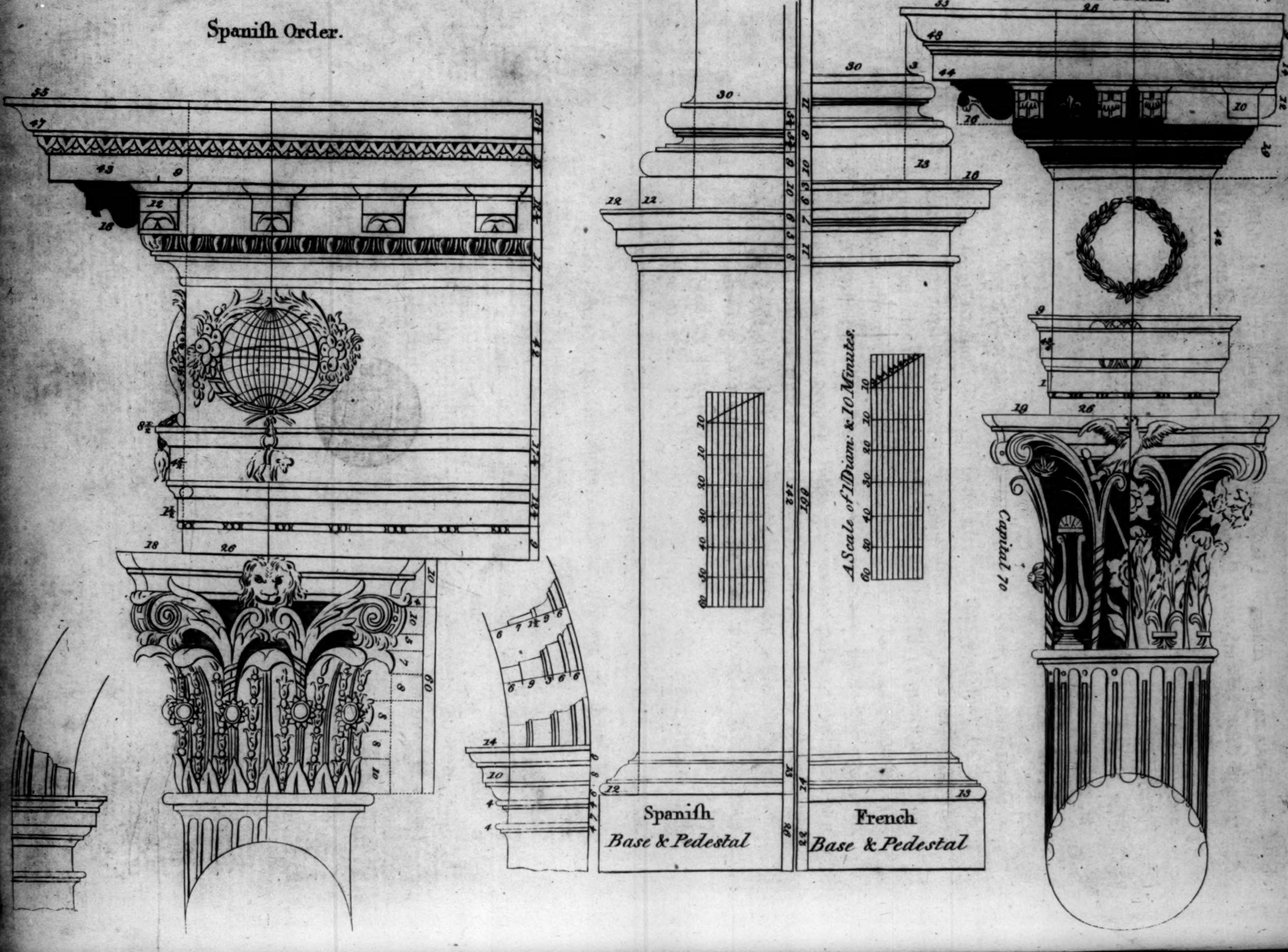
Plate XXXI.

Spanish Order.

French Order.



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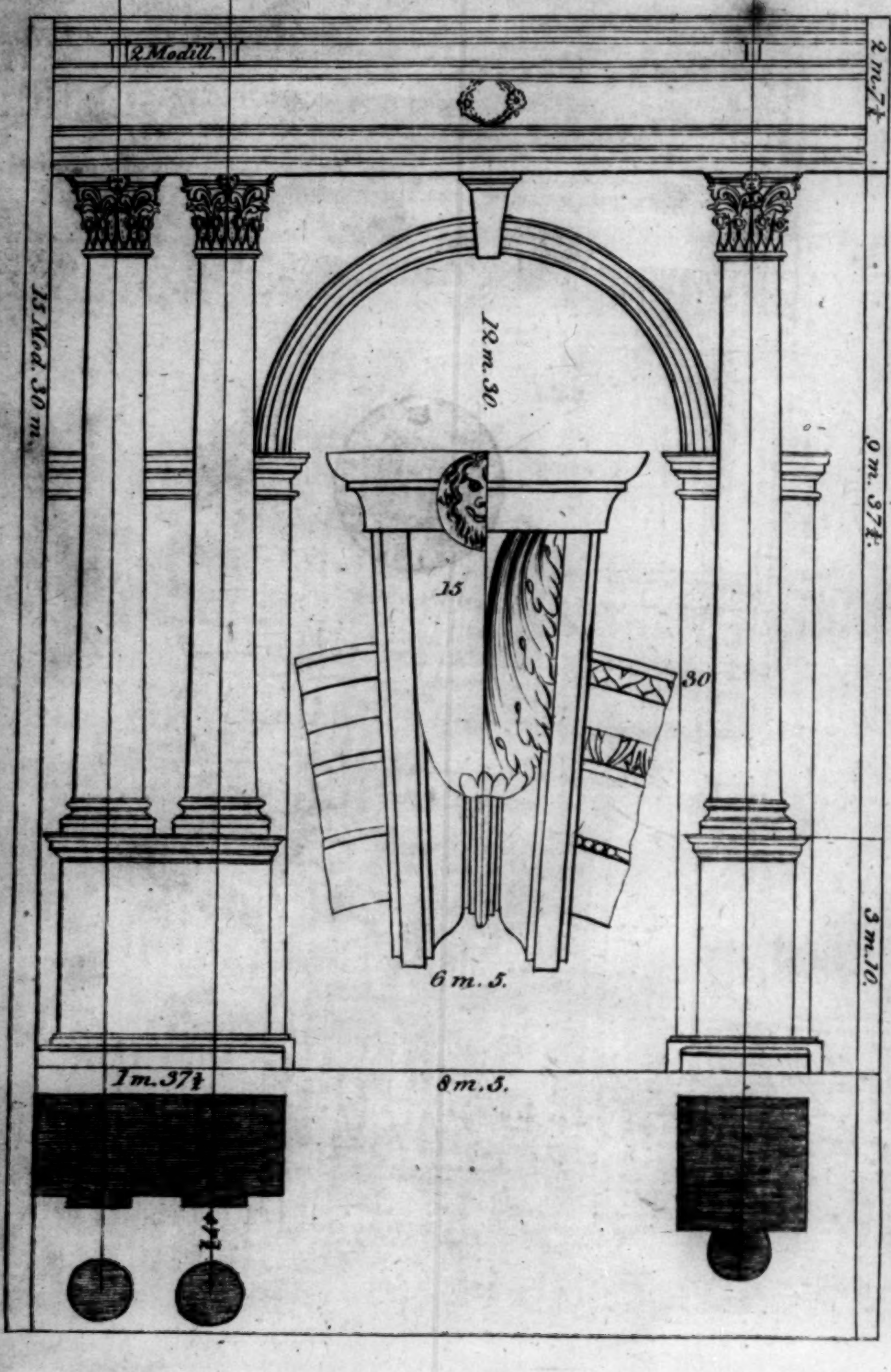
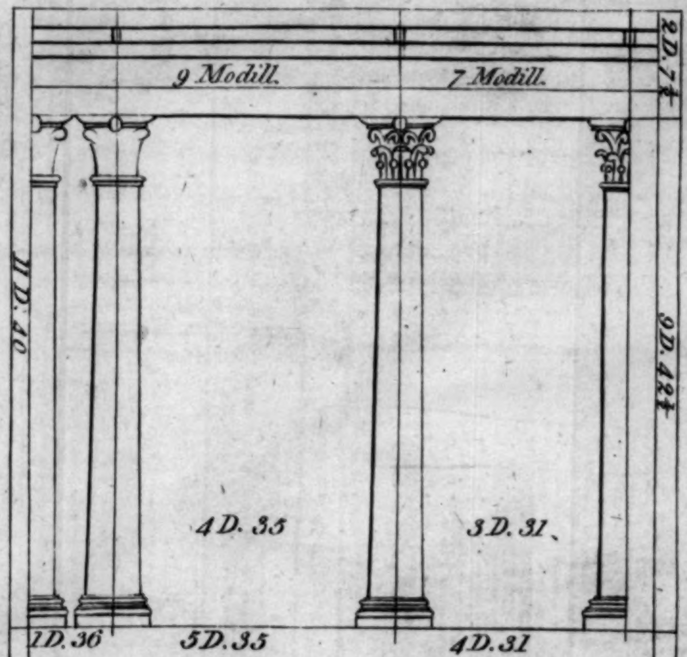
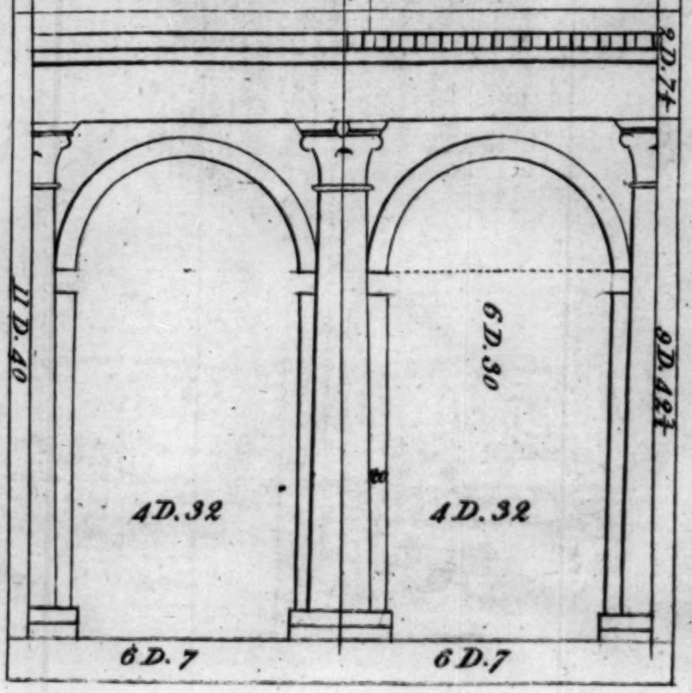
Entrance of the Spanish Order.



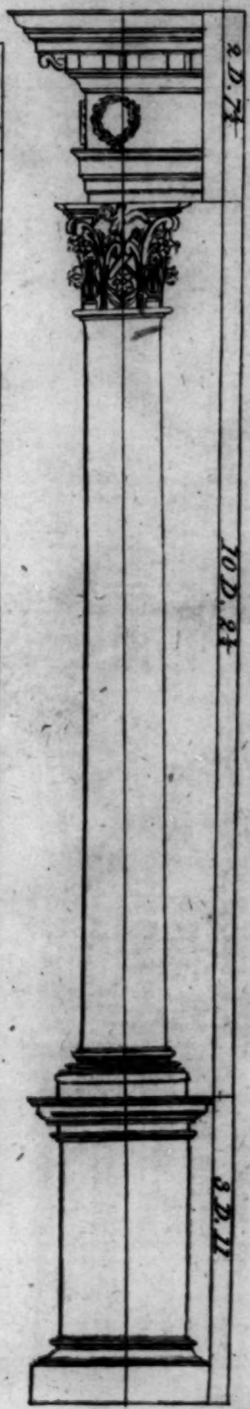
Intercolumnations of the Spanish Order.



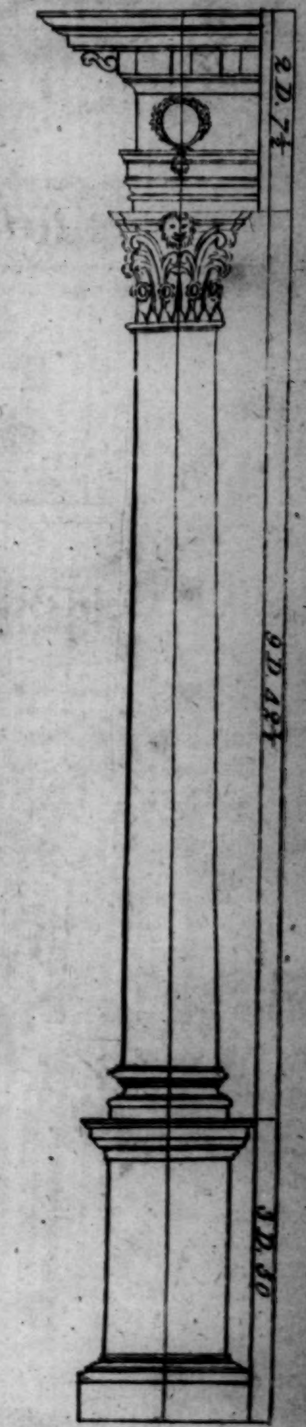
Arcades of the Spanish Order.



French Order entire.



Spanish Order entire.



tints of ink could be prepared twelve or more hours before you are to uſe them, as it ſettles all the groſs parts of the ink to the bottom of the cup, occaſioned by rubbing, which, when uſed immediately, makes the ſhade appear bloated; try all the tints upon a piece of ſeparate paper before you lay them upon your drawing.

The camel's hair-pencils you uſe muſt be well choſen; the ſhorter they are in the hair, and the ſmaller in the points, the better for almoſt every purpoſe: Thoſe you uſe for narrow ſhades, ſuch as the ſhadowing the mouldings of a cornice, muſt be very ſmall in the points; and thoſe for broad ſhades muſt be made broad in the points. In performing ſuch ſhades, great care muſt be taken to keep the pencil flowing with ink, ſo that it does not dry till the ſhade be completed.

Of the FRENCH ORDER.

This compoſition of the French Order was originally by S. Le Clerc, deſigner to the French King; it is more delicate than the Compoſite; the column, including baſe and capital, is 10 diam. 55 min.; the entablature is 2 diam. 15 minutes; the pedeſtal is 3 diam. 22 min.; ſo that the whole height is 16 diam. 32 min. The modillions are placed in pairs; the frize is ornamented with laurel crowns; the plate ſheweth, that the capital may be done two different ways. Inſtead of a roſe in the Corinthian capital, this order has a cock crowing, which is the ſymbol of France.

The intercolumniation of this order is regulated by the modillions; viz. for 1 pair of modillions, 1 diam. 34 min.; for 2 pair of modillions, 2 diam. 21 min.; for 4 pair of modillions, 3 diam. 27 min.; for 7 pair of modillions, 6 diam. 16 min; for 9 modillions, 7 diam. 50 minutes.

Of the SPANISH ORDER.

This order is likewiſe from S. Le Clerc; it is of greater ſtrength than the French; the column, including baſe and capital, is 9 diam. 55 minutes; the entablature is 2 diam. 15 min.; and the pedeſtal is 3 diam. 20 min.; ſo that the whole height is 15 diam. 30 min. See Plate XXXI. where it is delineated at large, and marked with figures ſufficient to explain it.

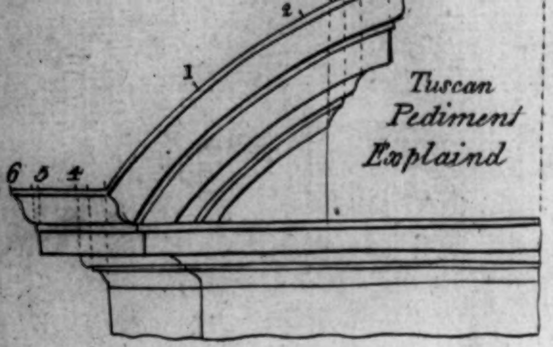
Note, The figures ſhewing the projections, both in this and the French order, are accounted from the naked line of the frize.

The intercolumniation of this order is regulated according to the number of modillions betwixt thoſe over the columns; viz. for 2 modillions, 1 diam. 36 min.; for 7 modillions, 4 diam. 31 min.; for 9 modillions, 5 diam. 35 min.; for 11 modillions, 6 diam. 7 min.; for 13 modillions, 8 diam. 5 minutes.

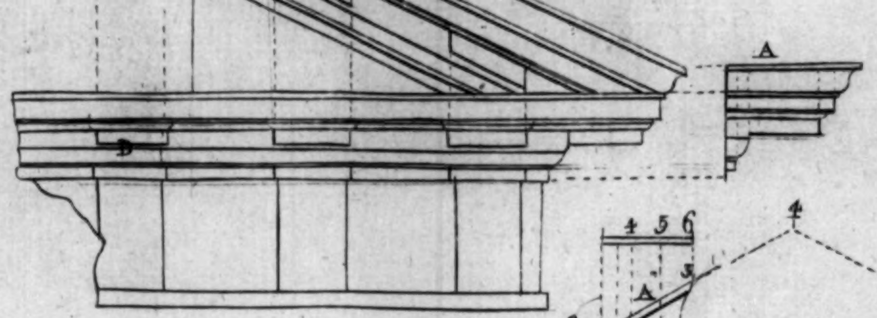
The DESCRIPTION *of a regular double* ROOF,

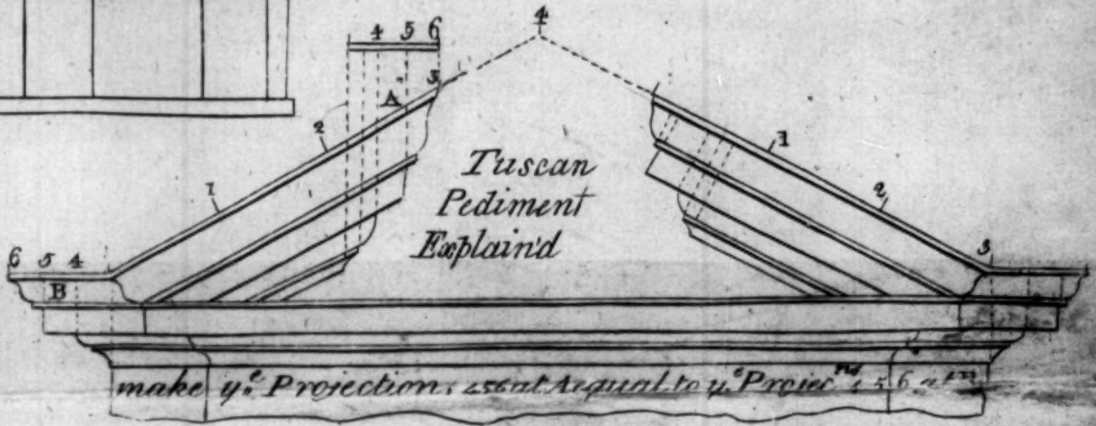
PLATE XXXIII. *Fig.* A.

The out-lines of this plan *a f g k*, wherein *h* B, BE, E *i*, and *i h*, are the ridges; *a* B, E *f*, *i k*, and *h g*, are the hips; *h* A C, BAC, DAE, BAE, and DA *i*, are the vallies; AC, BA, the gutter; *s q*, the height of the pitch; *p q* and *q r* a pair of principal raftets, *v f* and *t k* hip-rafters; lay out the ends *f e*, *i k*, and *a* B, *h g*; alſo the ſkirts *a b e f* and *g* AI *k*; continue *g* H to *c*, *k* I to *d*, *a b* to *c*, and *f e* to *d*; and, becauſe the length of the vallies are equal to the lengths of the hips, therefore, make H *c*, I *d*, *b c* and *d e*, each equal to one of the hips, as I *k*, and draw the lines *c d*:



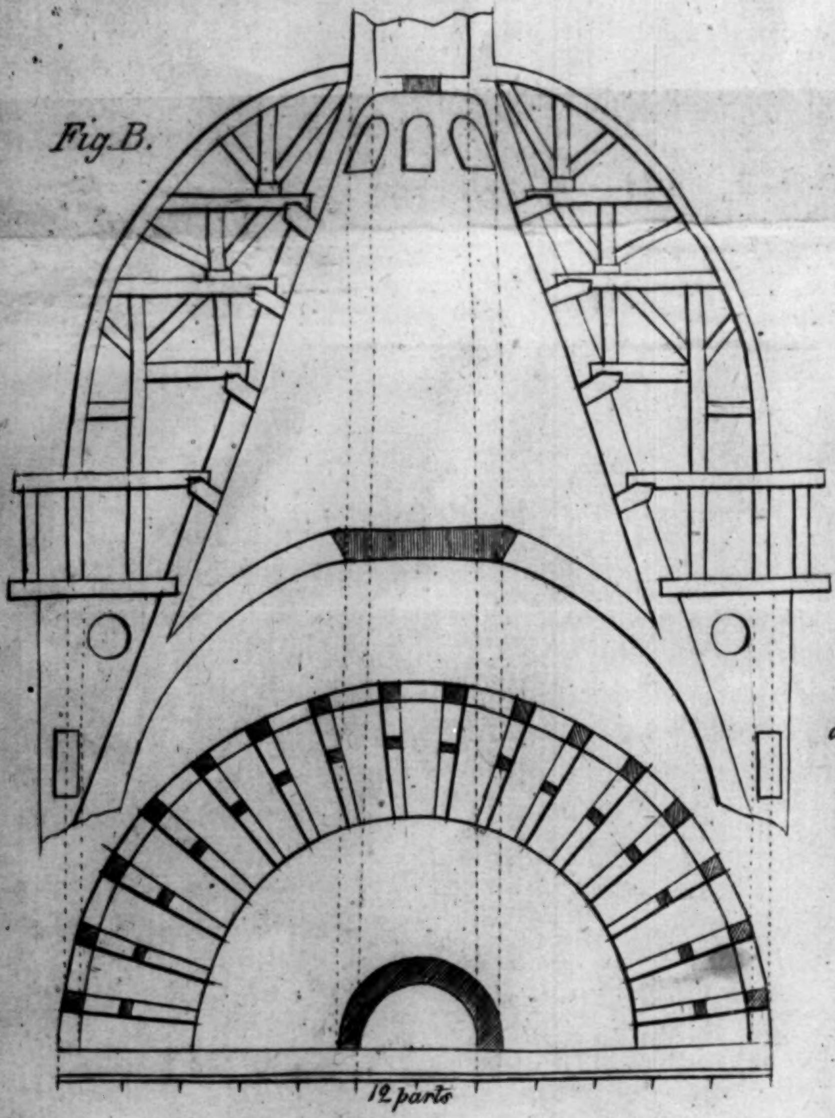
Tuscan Pediment Explaind




4 5 6
4
A
3
2
1
1
2
3
6 5 4
B
make ye Projection: 456 at A equal to ye Projecns 4 5 6 at B

Tuscan Pediment Explain'd

Fig. B.



A regular double roof Explaind

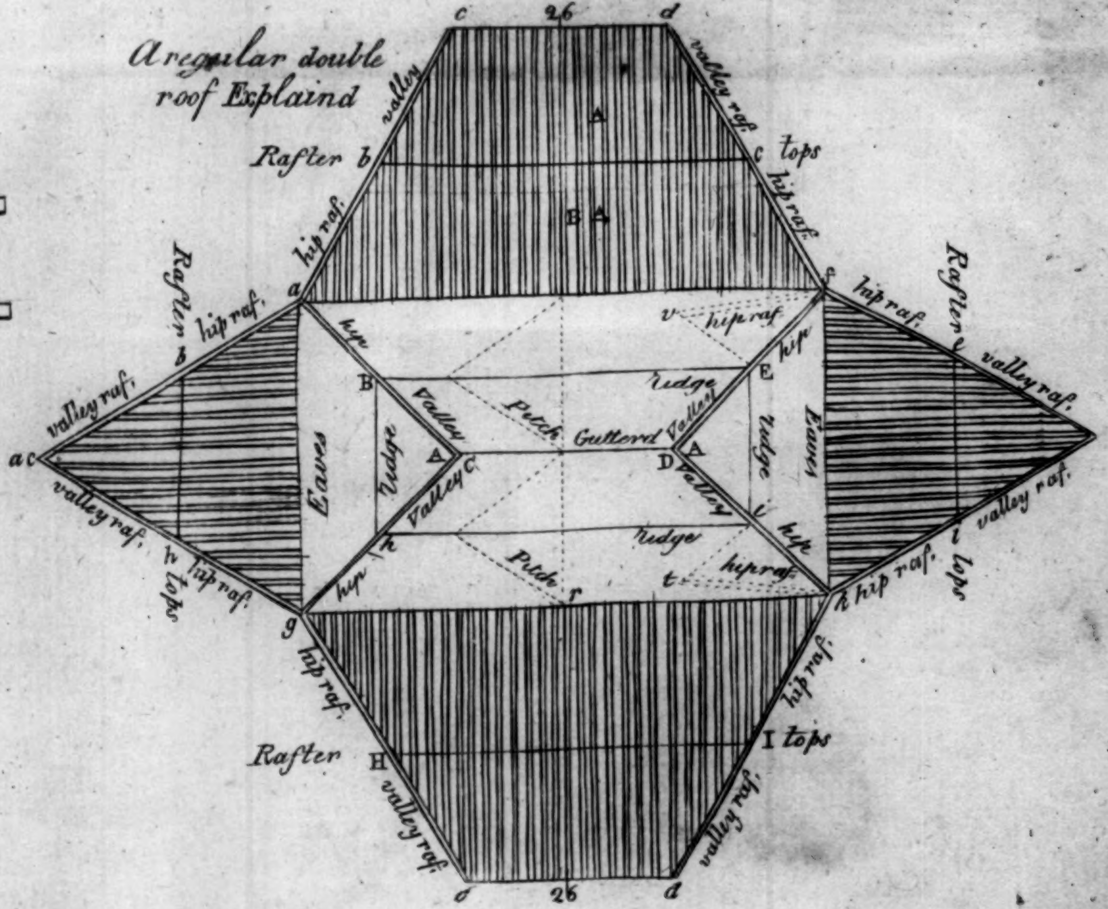


Plate XXXIII

Fig.1.

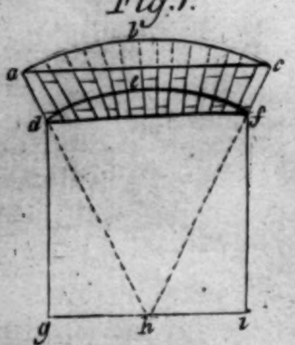


Fig.2.

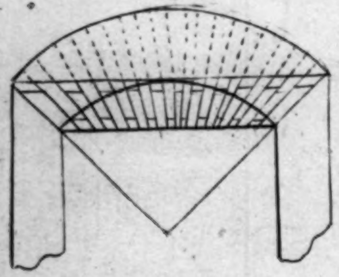
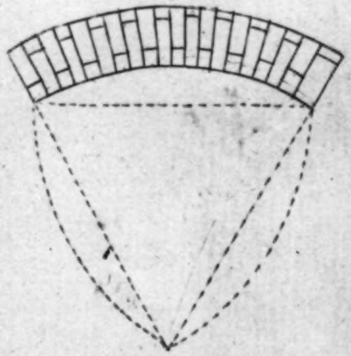
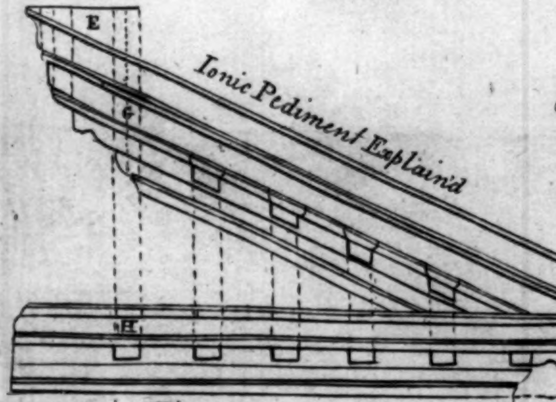


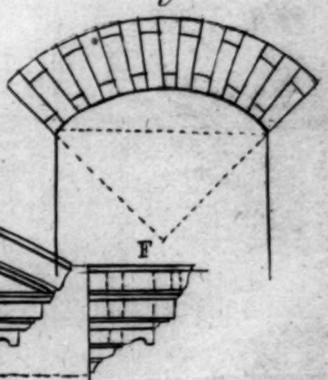
Fig.3.





Ionic Pediment Explain'd

Fig.4.



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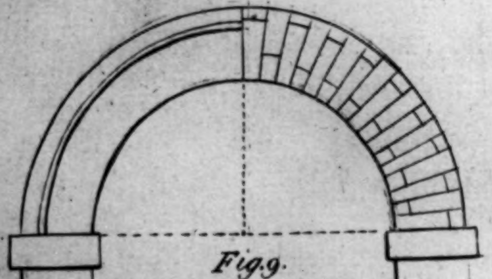

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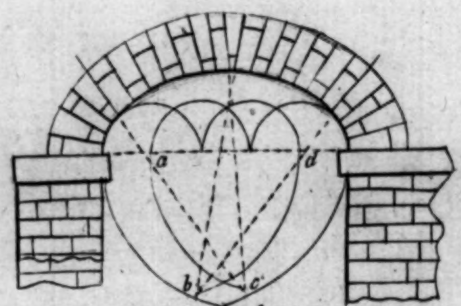

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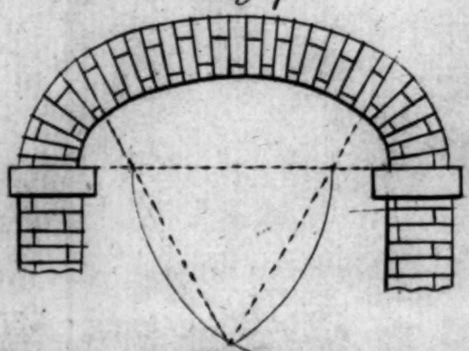

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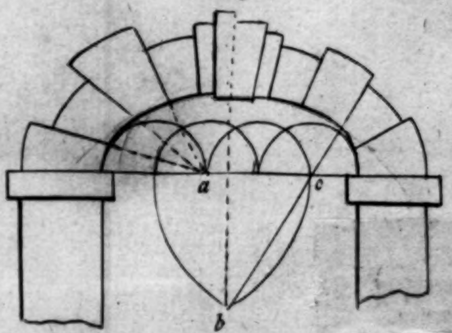


Fig.9.

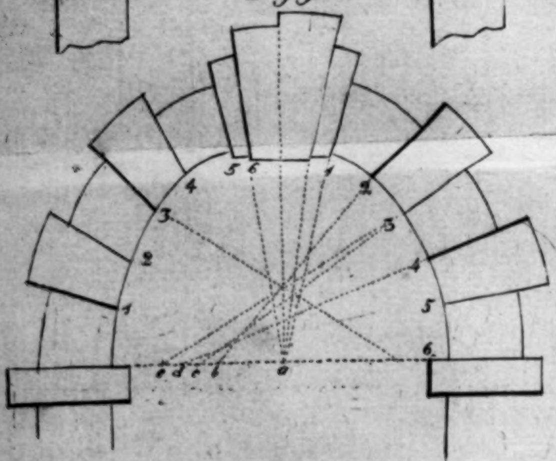
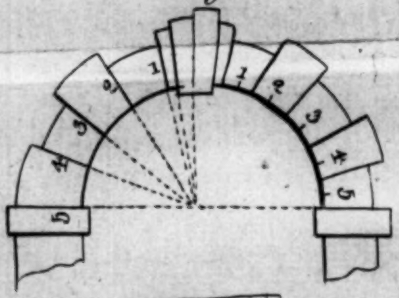


Fig.10.



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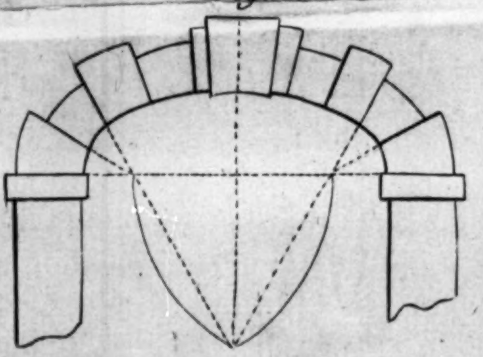
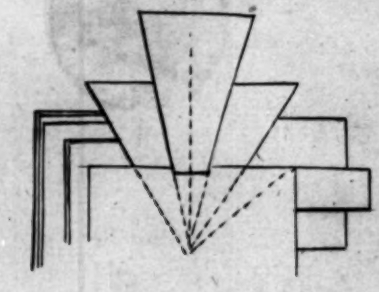
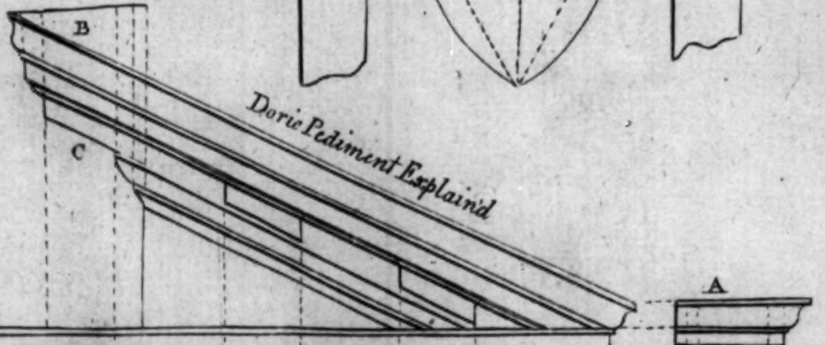
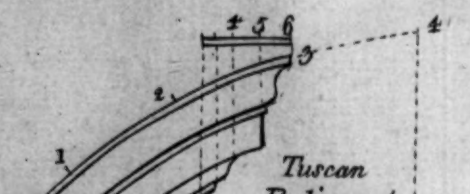


Fig.12.





Doric Pediment Explain'd



Tuscan

This being done, draw in all the principal and ſmall rafters at diſcretion, and then the whole will be completed, as required.

Fig. B, is a ſection of the dome of St Paul's.

The Conſtruction of BRICK *and* STONE ARCHES.

Semicircular-headed doors are more graceful than thoſe that are ſemi-elliptical; which laſt is ſeldom uſed but at ſuch times when the height will not admit of a ſemicircle, as being either too high or too low. When the given height, that an arch muſt riſe above the impoſts from which it ſprings, is more than half the breadth of the opening, the arch muſt be a ſemi-ellipſis made on the conjugate diameter, (as *fig.* 9, *Plate* XXXIII.) But when the given height is leſs than half the opening, the arch muſt be a ſemi-ellipſis made on the traverſe diameter, (as *fig.* 7. *Plate* XXXIII.) *Fig.* 1, 2, 3, 4, 5, 6, and 7, are arches of brick; *fig.* 1, and 3, the diſtance of the centre, to which all the joints have their ſommering, is equal to the breadth of the window; but thoſe of *fig.* 2, 4, is the centre of a geometrical ſquare, whoſe ſides are equal to their breadth; *fig.* 5, is a ſemicircular arch, whoſe joints ſommer to its centre; *fig.* 6, is a Gothic arch, which has its ſommerings at *a b c* and *d*.

Fig. 9. Is a ſemi-elliptical arch made on the conjugate diameter; the left-hand ſide of which ſommers to its centre *a*, and the right-hand ſide ſommers to *a b c d* and *e*; *fig.* 10, is a ſemicircular ſtone arch.

A TABLE of the different Proportions in the FIVE ORDERS of ARCHITECTURE, as laid down by *Modern* and *Ancient* Authors.

			Rudiments of Architecture.		Builder's Repoſitory.		Mr Gibb's method.		Mr Langley's method.		Sebaſtian Le Clerc's method.				
			D.	M.	D.	M.	D.	M.	D.	M.		D.	M.		D.	M.
TUSCAN ORDER.	Column Entab.	Cornice	0	44	0	45	0	45	0	40	First Tuſcan Order.	0	40	Second Tuſcan Order.	0	13
		Frize	0	26	0	30	0	30	0	30		0	36		0	36
		Architrave	0	35	0	30	0	30	0	30		0	32		0	32
	Column	Capital	[illegible]	30	0	30	0	30	0	30		0	30		0	30
		Shaft	6	0	6	0	6	0	6	20		6	0		7	0
		Baſe	0	30	0	30	0	30	0	30		0	30		0	30
	Pedeſt.	Cornice	0	15	0	22	0	$16\frac{3}{8}$	0	15		0	23		0	20
		Die or body	1	15	1	5	1	11	1	15		1	39		1	15
		Baſe	0	30	0	44	0	$43\frac{7}{8}$	0	39		0	23		0	30
		Total	10	45	10	56	10	$56\frac{2}{8}$	11	9		11	13		11	26
DORIC ORDER.	Column Entab.	Cornice	0	45	0	45	0	45	0	45		0	47			
		Fize	0	45	0	45	0	45	0	45		0	43			
		Architrave	0	30	0	30	0	30	0	30		0	30			
	Column	Capital	0	30	0	30	0	30	0	30		0	30			
		Shaft	7	0	7	0	7	0	7	0		7	0			
		Baſe	0	30	0	30	0	30	0	30		0	30			
	Pedeſt.	Cornice	0	20	0	22	0	$18\frac{3}{4}$	0	15		0	15			
		Die or body	1	20	1	25	1	$21\frac{1}{4}$	1	15		1	35			
		Baſe	0	42	0	43	0	50	0	45		0	30			
		Total	12	29	12	30	12	30	12	15		12	20			
IONIC ORDER.	Column Entab.	Cornice	0	45	0	45	0	43	0	45		0	50	French Order.	0	54
		Frize	0	27	0	27	0	$32\frac{1}{2}$	0	30		0	40		0	42
		Architrave	0	36	0	36	0	$32\frac{1}{2}$	0	30		0	35		0	39
	Column	Capital	0	31	0	30	0	30	0	30		0	30		1	10
		Shaft	7	59	8	0	8	0	7	59		8	0		8	25
		Baſe	0	30	0	30	0	30	0	30		0	30		0	30
	Pedeſt.	Cornice	0	21	0	23	0	$20\frac{1}{4}$	0	16		0	16		0	27
		Die or body	1	40	1	32	1	$27\frac{3}{4}$	1	30		2	13		2	19
		Baſe	0	42	0	46	0	54	0	46		0	35		0	36
		Total	13	31	13	29	13	30	13	16		14	9		16	32
CORINTHIAN ORDER.	Column Entab.	Cornice	0	$47\frac{1}{2}$	0	48	0	48	0	49		0	52			
		Frize	0	$28\frac{1}{2}$	0	28	0	36	0	35		0	40			
		Architrave	0	38	0	38	0	30	0	38		0	38			
	Column	Capital	1	10	1	10	1	10	1	10		0	70			
		Shaft	7	50	7	50	8	20	7	50		8	20			
		Baſe	0	30	0	30	0	30	0	30		0	30			
	Pedeſt.	Cornice	0	19	0	24	0	$22\frac{1}{2}$	0	19		0	15			
		Die or body	1	50	1	37	1	$37\frac{1}{2}$	1	50		2	30			
		Baſe	0	39	0	49	1	0	0	39		0	33			
		Total	14	12	14	15	15	0	14	20		15	20			
COMPOSITE ORDER.	Column Entab.	Cornice	0	50	0	50	0	48	0	50		0	53	Spaniſh Order.	0	54
		Frize	0	30	0	30	0	36	0	30		0	43		0	4[illegible]
		Architrave	0	40	0	40	0	36	0	41		0	39		0	39
	Column	Capital	1	10	1	10	1	10	1	10		0	70		1	5
		Shaft	8	20	8	20	8	20	8	20		7	30		8	20
		Baſe	0	30	0	30	0	30	0	30		0	30		0	30
	Pedeſt.	Cornice	0	22	0	25	0	$22\frac{1}{2}$	0	22		0	16		0	19
		Die or body	1	53	1	43	1	$37\frac{1}{2}$	1	52		2	28		2	22
		Baſe	0	44	0	51	1	0	0	44		0	35		0	39
		Total	15	0	15	0	15	0	15	0		14	36		15	30

A TABLE of the different Proportions in the FIVE ORDERS of ARCHITECTURE, as laid down by *Modern* and *Ancient* Authors.

			Palladio.		Scamozzi.		Vignola.		Joſeph Viola.		C. Baptiſta Alberti.	
			D.	M.	D.	M.	D.	M.	D.	M.	D.	M.
TUSCAN ORDER.	Entab.	Cornice	0	43	0	41	0	40				
		Frize	0	26	0	39	0	35				
		Architrave	0	33	0	32	0	32				
	Column	Capital	0	30	0	30	0	30				
		Shaft	6	0	6	30	6	0				
		Baſe	0	30	0	30	0	30				
	Pedeſt.	Cornice	0	20	0	20	0	16				
		Die or body	1	9	1	10	1	14				
		Baſe	0	45	0	50	0	50				
		Total	10	56	11	42	11	7				
DORIC ORDER.	Entab.	Cornice	0	38	0	47	0	45	0	40	0	34
		Frize	0	45	0	45	0	45	0	45	0	45
		Architrave	0	30	0	35	0	30	0	30	0	30
	Column	Capital	0	30	0	30	0	30	0	30	0	33
		Shaft	7	0	7	0	8	0	7	0	6	47
		Baſe	0	30	0	30	0	30	0	30	0	30
	Pedeſt.	Cornice	0	20	0	23	0	18	0	20	0	21
		Die or body	1	20	1	17	1	20	1	18	1	19
		Baſe	0	40	0	42	0	40	0	45	0	43
		Total	12	13	12	29	13	18	12	18	12	2
IONIC ORDER.	Entab.	Cornice	0	46	0	42	0	52½	0	45	0	40
		Frize	0	27	0	28	0	45	0	27	0	30
		Architrave	0	36	0	35	0	37½	0	36	0	30
	Column	Capital	0	30	0	30	0	30	0	30	0	30
		Shaft	8	0	8	0	9	0	8	0	8	30
		Baſe	0	30	0	30	0	30	0	30	0	30
	Pedeſt.	Cornice	0	21	0	18	0	18	0	16	0	18
		Die or body	1	39	1	40	1	40	1	45	2	43
		Baſe	0	42	0	43	0	40	0	43	0	45
		Total	13	31	13	26	14	53	13	32	14	56
CORINTHIAN ORDER.	Entab.	Cornice	0	48½	0	48	1	0	0	47	0	40
		Frize	0	28½	0	32	0	45	0	28	0	30
		Architrave	0	38	0	40	0	45	0	33	0	30
	Column	Capital	1	10	1	10	1	10	1	10	1	0
		Shaft	7	50	8	20	8	20	7	50	7	40
		Baſe	0	30	0	30	0	30	0	30	0	30
	Pedeſt.	Cornice	0	19	0	20	0	15	0	17	0	20
		Die or body	1	33	1	34	1	29	1	30	1	37
		Baſe	0	38	0	40	0	45	0	46	0	40
		Total	13	55	14	34	14	59	13	51	13	27
COMPOSITE ORDER.	Entab.	Cornice	0	50	0	46	1	0	0	56	0	50
		Frize	0	30	0	31¼	0	49	0	40	0	38
		Architrave	0	40	0	39	0	45	0	49	0	48
	Column	Capital	1	10	1	10	1	10	1	10	1	0
		Shaft	8	20	8	50	8	20	8	30	8	40
		Baſe	0	30	0	30	0	30	0	30	0	30
	Pedeſt.	Cornice	0	25	0	24	0	26	0	25	0	27
		Die or body	2	5	2	0	1	56	1	50	2	0
		Baſe	0	50	0	40	0	40	0	40	0	45
		Total	15	0	15	31	15	36	15	30	15	30

References to the foregoing TABLES.

S. Le Clerc has two Tuſcan Orders. The one he calls his *firſt* has its entablature very different from any of the others in the Table; the upper member of which is an *ovolo*, or quarter-round; below the *corona* is a *cima reverſa*, of 10 min. in height, inſtead of the *ovolo*, *fillet*, and *cavetto;* the *architrave* only conſiſts of one *facia*, which is found in the ſame perpendicular with the *frize*. In his Doric entablature, he has a *cavetto* inſtead of the *cima recta*.

Scamozzi omits the mutules in his Doric Order; inſtead of which he places dentiles.

Vignola likewiſe omits the mutules, only placing bells or drops in the bottom of the *corona*, below which he has dentiles.

Alberti differs only from *Vignola* in not having dentiles.

PART II.

CHAP. I.

GEOMETRICAL DEFINITIONS *and* PROBLEMS, *neceſſary to be known by thoſe who are deſirous to underſtand the* Art of Building.

DEFINITIONS. PLATE I.

1. A Point has no parts: That is, a geometrical point is not any body, or quantity, but only an aſſignable place in any body, or quantity, noted by a point, and is made with your compaſſes, pen, or pencil, &c. as A.

Such a place may be conceived ſo infinitely ſmall as to be void of length, breadth, and thickneſs; and therefore, a point may be ſaid to have no parts.

2. A line is a body, or quantity, having length without any conſideration of breadth or thickneſs. Of lines there are three ſorts; viz. curved, that is, crooked lines, as A; ſtreight lines, as B; and mixed lines, which are compounded of both the former, as C.

3. Parallel lines are thoſe that lye equally diſtant from one another in all their parts, viz. ſuch lines, being infinitely extended, will never meet as X.

4. Lines not parallel, but inclining, viz. leaning one towards another, meet and make an angle; the point where they meet is called *the angular point thus* <.

5. Of angles, there are three ſorts; viz. right angles E; obtuſe angles F; and acute angles G.

6. A ſuperficies, or ſurface, is the upper, or very outſide of any viſible thing. But by ſuperficies, in geometry, is meant only ſo much of the outſide of any thing as is incloſed within a line, or lines, according to the form or figure of the thing deſigned; and hath length and breadth, but is conceived to have no thickneſs. Conſequently the bounds, or limits, of a ſuperficies, are lines as D.

Note, The ſuperficies of any figure is uſually called its *area.*

7. A circle is a plain regular figure, whoſe area is bounded or limited by one continued line, called the *circumference*, or *periphery of the circle*, made by the motion of the compaſſes round a point called its *centre.* A line drawn through the centre is called the *diameter*, as HI.

8. A triangle is a figure contained within the limits of three right lines, called *ſides*, including three angles. Of triangles, there are ſeveral ſorts, as the right-angled triangle K; the equilateral triangle L; the iſoſceles triangle M; and the ſcalenous triangle N.

Of four-ſided figures there are alſo many ſorts, as the ſquare O; which is a plain regular figure whoſe ſuperficies is limited by four equal ſides, all at right angles with one another.

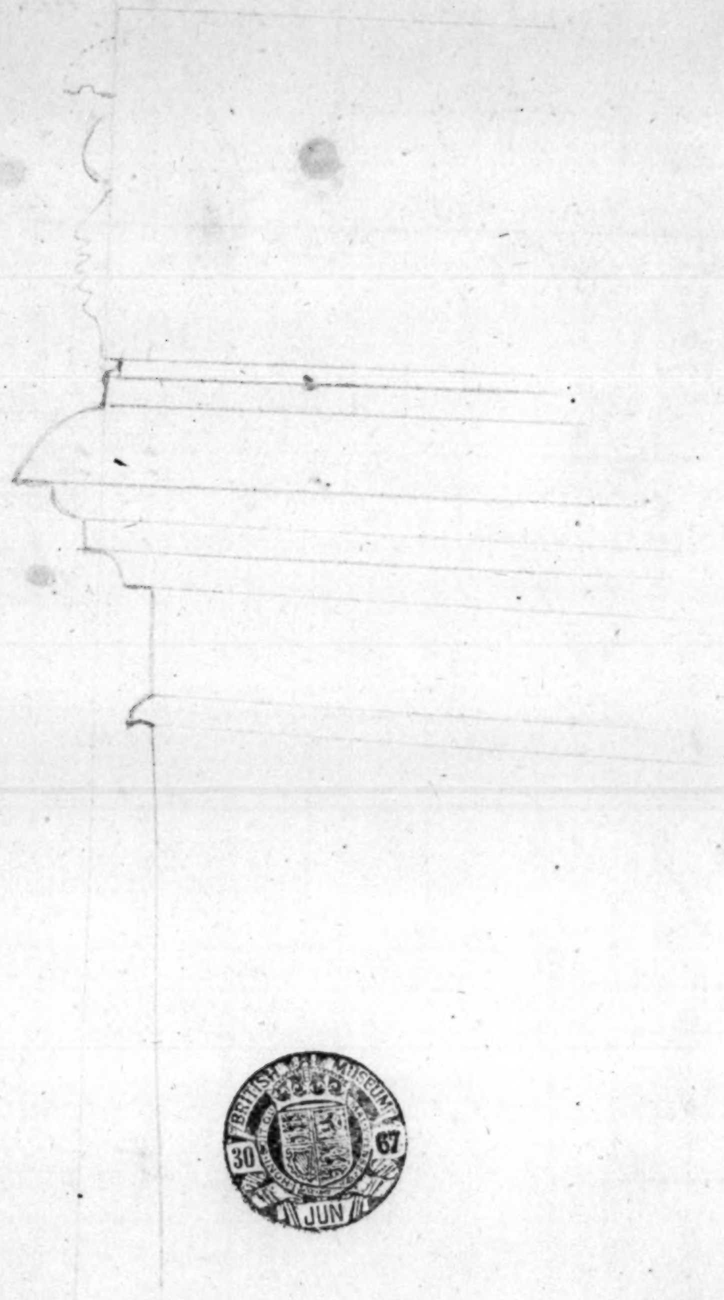


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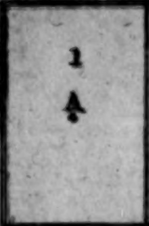
Plate 1st. Part IId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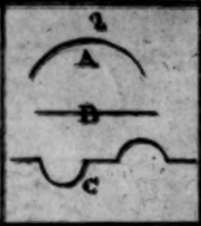
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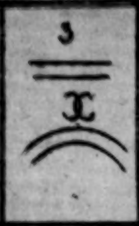
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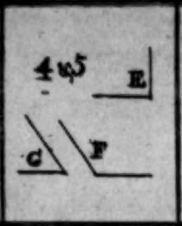
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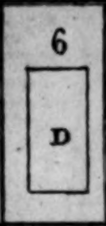
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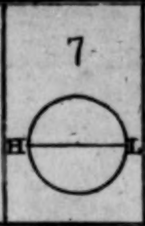
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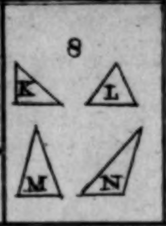
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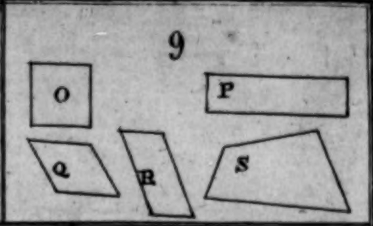
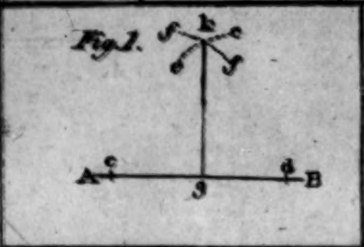

9

Fig. 1.


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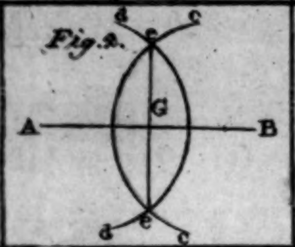

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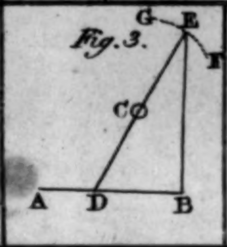

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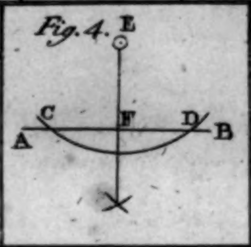

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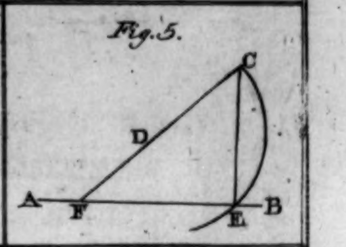

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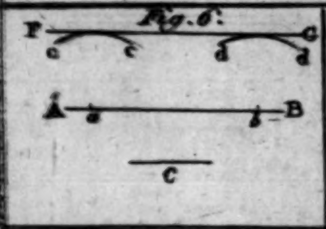

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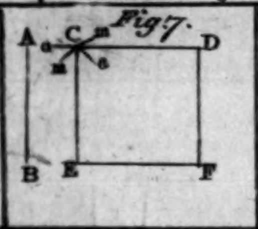
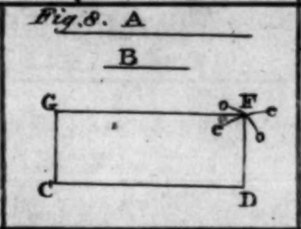


Fig. 8. A


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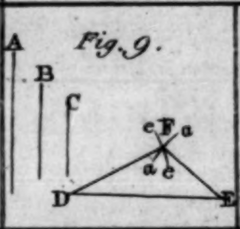

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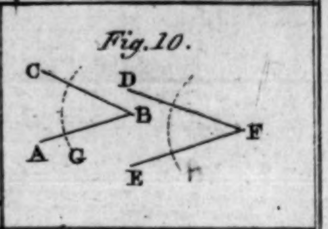

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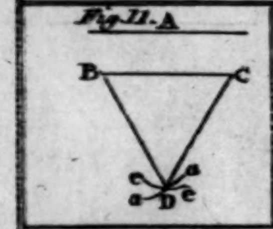

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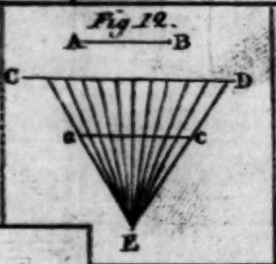

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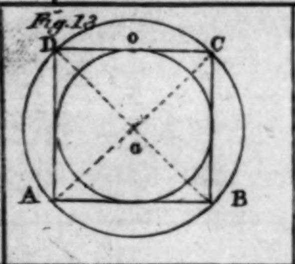

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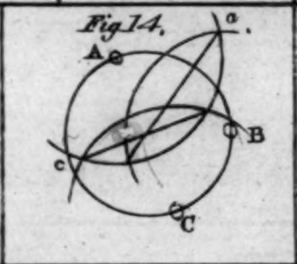

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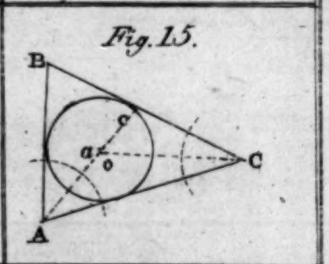

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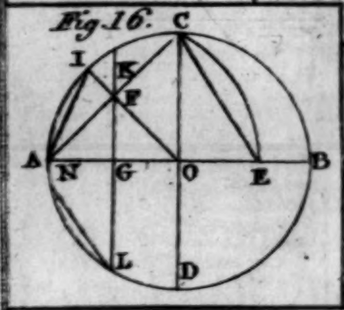

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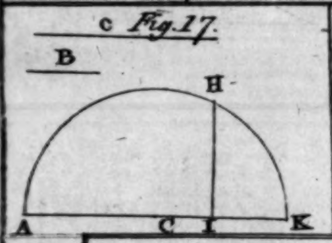

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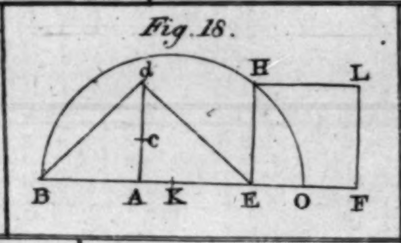

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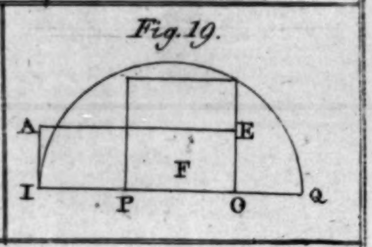

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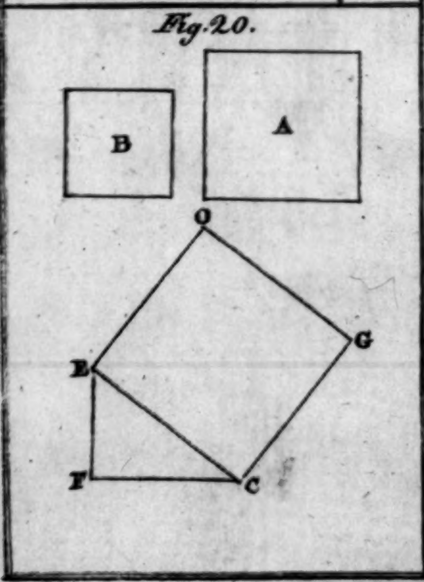

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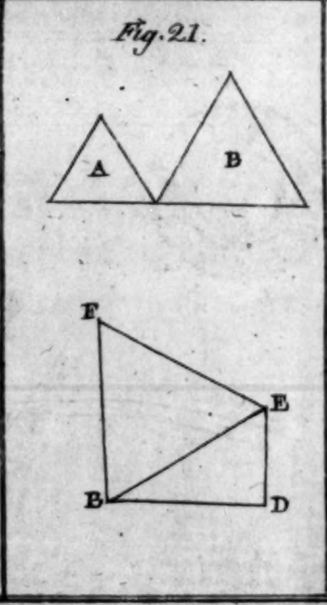

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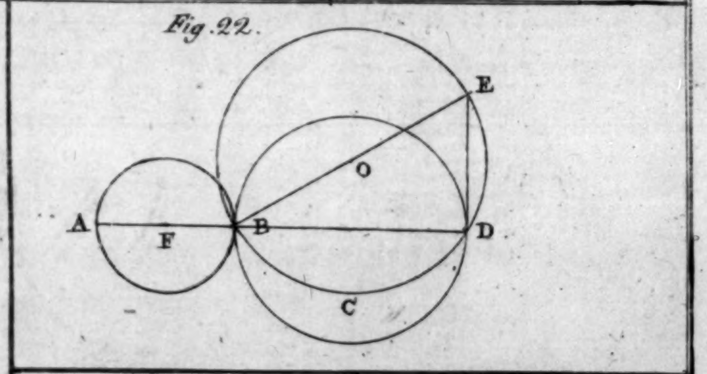

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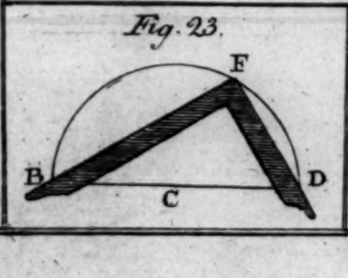

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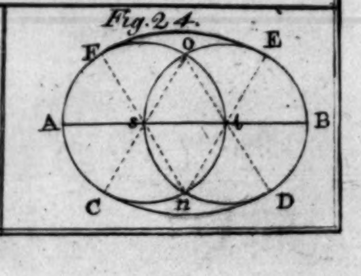

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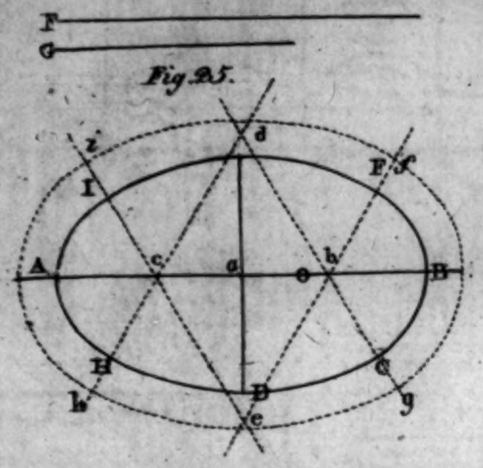
Plate IId. Part IId.

Fig. 25.



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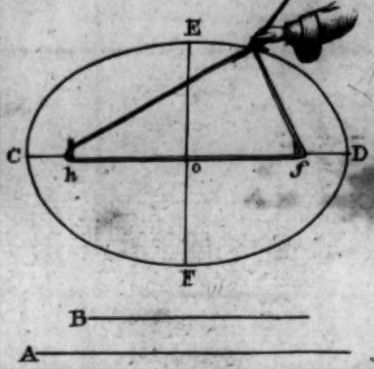

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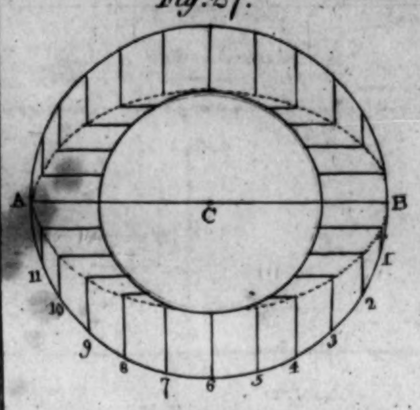

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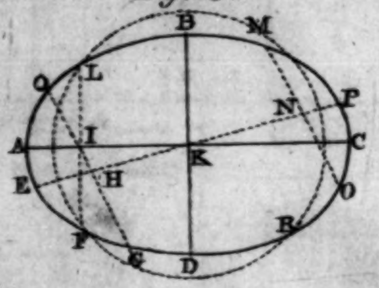

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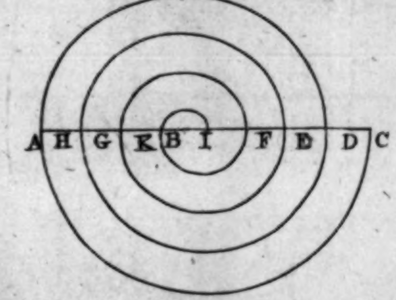

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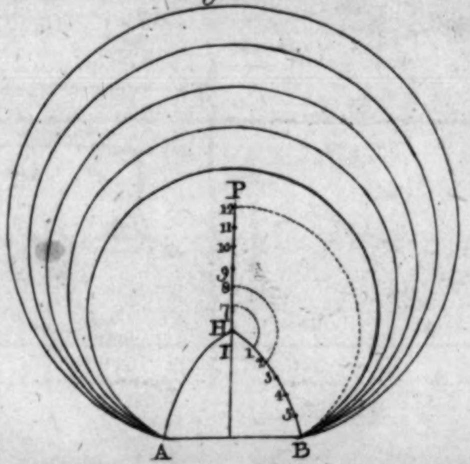

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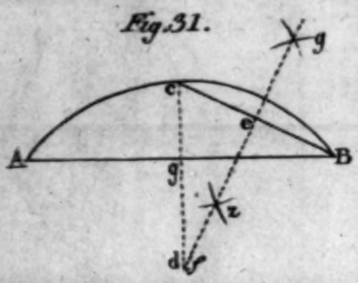

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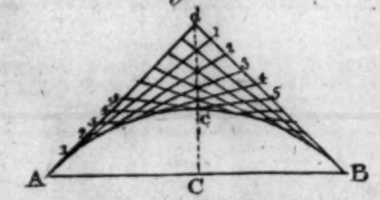

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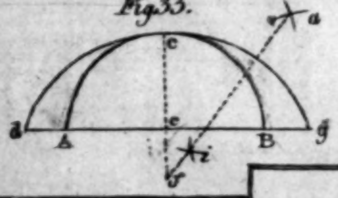

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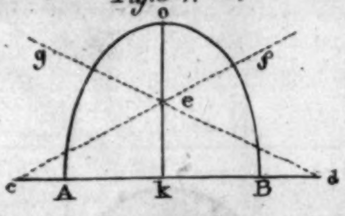

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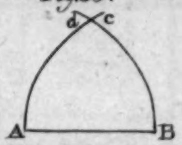

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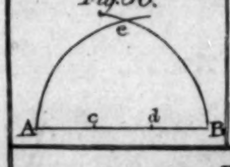

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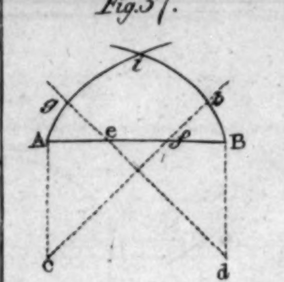

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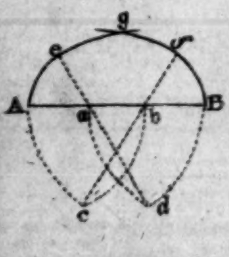

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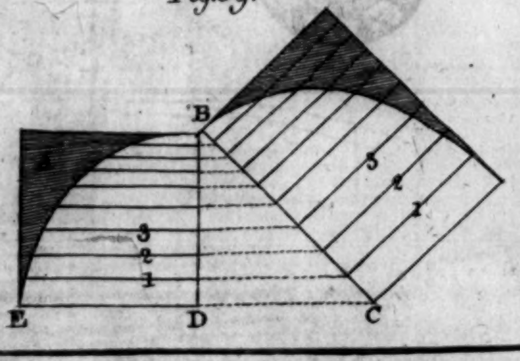

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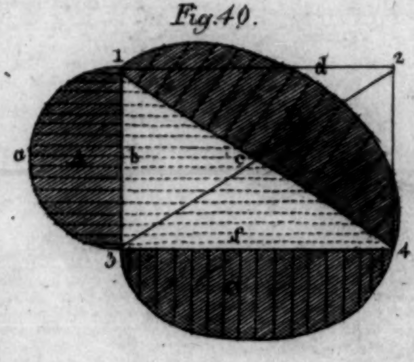

The rhombus, or diamond-like figure, is that which has four equal ſides, but no right angle; that is, a rhombus is a ſquare moved out of its right poſition, as Q.

A parallelogram, often called *an oblong*, or *long ſquare*, is a figure that hath four right angles, and its two oppoſite ſides equal, as P.

A rhomboides is an oblique angled parallelogram; that is, it is a parallelogram moved out of its right poſition, as the figure marked R.

Note. All four-ſided figures, which differ from thoſe before mentioned are called *trapezias;* that is, when they have neither oppoſite ſides, nor oppoſite angles equal, as S.

A polygon is a figure that has more than four ſides; and of theſe there are ſeveral ſorts: A figure having five equal ſides, and equal angles, is called *a pentagon;* one of ſix ſides a hexagon; one of ſeven ſides a heptagon; one of eight ſides an octagon; one of nine ſides a nonagon; one of ten ſides a decagon, &c.

C H A P. II.

Prob. I. *Fig.* 1. *From any Point in a given right Line, to erect a perpendicular.*

LET AB be a right line given, and upon it, from the point *g*, let it be required to erect the perpendicular *g k*.

Firſt, Open your compaſſes to any ſmall diſtance, and ſetting one foot in the point *g*, with the other foot, make the two marks *c* and *d*.

Secondly, Open the compaſſes to any other diſtance greater than the former, and ſetting one foot in *d*, with the other deſcribe the arch *e e*; and removing the compaſſes to *c*, deſcribe the arch *f f*, croſſing the former in the point *k*. *Laſtly*, From *g* to *k*, draw the right line *g k*; it will be the perpendicular required.

PROB. II. *Fig.* 2. *To divide a right Line, as* AB, *into two equal Parts, in a given Point, as* G, *by a right Line, at e e, perpendicular thereto.*

Let AB be a line given, to be divided into two equal parts by a perpendicular, in the point G, by the perpendicular line *e e*.

Firſt, Open your compaſſes to any diſtance greater than half the line AB, and ſetting one foot of the compaſſes in A, with the other deſcribe the arch *d d*.

Secondly, Set one foot of the compaſſes in B, and deſcribe the arch *c c*, croſſing the former in the points *e e*: *Laſtly*, Draw the line *e e*, and it ſhall divide the given line AB, into two equal parts, in the point G, and ſhall alſo be perpendicular thereunto.

PROB. III. *Fig.* 3. *To erect a perpendicular upon the End of a right Line.*

Let AB be a right line given, and, from the end B, let it be required to a perpendicular B *e*.

Firſt, Open your compaſſes to any ſmall diſtance, and ſetting one foot of the compaſſes in B, pitch down the other foot at ad-venture, as at the point C; and, that foot of the compaſſes reſting in C, turn the other leg about till it croſs the given line in the point D, and, the foot ſtill reſting in C, with the other deſcribe the arch FG over the given point B; then, laying a ruler from D to C, it will cut the arch GF in *e*: *Laſtly*, Draw the line *b e*, which will be the perpendicular required.

Prob. IV. *Fig.* 4. *From a given Point over a right Line, to let fall a Perpendicular to that Line.*

Let AB be the line given, and, from the point E, let it be required to let fall the perpendicular EF.

Firſt, Open your compaſſes to any diſtance greater than from E to F; and ſetting one foot of the compaſſes in E, with the other deſcribe the arch CD.

Secondly, By the ſecond problem, divide the line CD in two equal parts, in the point F.

Laſtly, Draw the right line EF, which will be the perpendicular ſought.

Prob. V. *Fig.* 5. *From a given Point which is juſt over, or very near, the End of a right Line, to let a Perpendicular thereon.*

Let AB be a line given, and, from the point C, let it be required to let fall a perpendicular CE.

Firſt, From the point C, draw a right line CF, croſſing the given line AB; which line divide into two equal parts, in the point D, (by Prob. II.); then ſet one foot of the compaſſes in D, and, opening the other to the point C, deſcribe the arch CE, cutting the given line AB in the point E: *Laſtly*, Draw the line CE, which will be perpendicular to AB, and near to the end thereof.

Prob. VI. *Fig.* 6. *A right Line being given, to draw another right Line, which ſhall be parallel thereunto, at any Diſtance required.*

Let AB be a right line given; and, let it be required to draw another right line FG, parallel thereunto, at the diſtance of the line C.

Firſt, Take with your compaſſes the length of the line C, and ſetting one foot of the compaſſes in *a*, with the other deſcribe the arch of a circle *c c*: then, keeping the ſame opening of the compaſſes, deſcribe, from *b*, another arch *d d*.

Laſtly, Lay a ruler to theſe two arches *c c* and *d d*, ſo that it may only touch the very top of them, and draw the line FG; which will be the parallel line required.

Prob. VII. *Fig.* 7. *To make a Geometrical Square, whoſe Sides ſhall all be equal to a right Line given.*

Let AB be a Line given, and let it be required to make the geometrical ſquare CDEF, each of whoſe ſides ſhall be equal to the given line AB.

Firſt, Draw the line EF equal in length to the given line AB, and upon the end thereof F, (by Prob. III.), erect the perpendicular FD, equal in length alſo to the given line AB.

Again: Take the given line AB in your compaſſes, and ſetting one foot of them in E, with the other deſcribe the arch *a a*; alſo, ſet one foot in F, and with the diſtance ED, deſcribe the arch *m m*, cutting the former arch in the point C.

Laſtly, Draw the lines CD and CE, ſo ſhall you have formed the geometrical ſquare CDEF.

Prob. VIII. *Fig.* 8. *To make a Parallelogram, whoſe Sides ſhall be equal to any two Lines given.*

Let A and B be the two lines given, and let it be required to make the parallelogram CDGF, whoſe two ſhorteſt ſides ſhall be equal to the line B, and its longeſt ſides to the line A.

Firſt, Take in your compaſſes the length of the longeſt line A, and draw the line CD equal thereunto, and upon C erect the perpendicular line CG equal to the line B.

Secondly, Take the line B in your compaſſes, and ſetting one foot, in D, deſcribe the arch *e e;* alſo, take in your compaſſes the diſtance from D to G, and ſetting one foot of the compaſſes in C, deſcribe the arch *o o*, croſſing the former in the point F.

Laſtly, Draw the lines GF and CD, which will form the required parallelogram CDGF.

Prob. IX. *Fig.* 9. *To make a Triangle whoſe Sides ſhall be reſpectively equal to the three given right Lines.*

Let the three given lines be AB and C, and let it be required to make a triangle, whoſe three ſides are equal to the three given lines.

Firſt, Take in your compaſſes the longeſt of the given right lines, and draw a line equal thereto, as DE; then, *ſecondly*, take in your compaſſes the length of the given line B, and, ſetting one foot of the compaſſes in D, with the other deſcribe the arch *e e*: Then, *thirdly*, take in your compaſſes the length of the given line C, and ſetting one foot of the compaſſes in E, deſcribe the arch *a a*, croſſing the former in the point F: *Laſtly*, Draw the two right lines DF and EF; ſo ſhall they conſtitute the triangle DEF required.

PROB. X. *Fig.* 10. *To make an Angle equal to an Angle given.*

Let ABC be an angle given, and let it be required to make another angle DFE equal thereunto.

Firſt, Draw a right line as EF. Then, the compaſſes being opened to any convenient diſtance, ſet one foot in the given angular point B, and deſcribe an obſcure arch of a circle, as GH, which muſt cut both the ſides of the angle, viz. AB and BC. *Secondly*, The compaſſes ſtill reſting at the ſame diſtance, ſet one foot in F, and deſcribe the arch *e e*, making *e e* equal to GH. *Laſtly*, From F, through the point *e*, draw the line DF, which will form the angle DFE, equal to ABC, as was required.

PROB. XI. *Fig.* 11. *To make an equilateral Triangle whoſe Sides ſhall be all equal to a right Line given.*

Let the given line be A, whereof it is required to make an equilateral triangle BCD.

Firſt, Take between your compaſſes the length of the given line A, and draw the line BC equal thereunto. Set then one foot of the compaſſes in B, and, at the diſtance of the given line

A, deſcribe the arch *a a*. The compaſſes ſtill remaining with the ſame opening, remove the foot of the compaſſes from B to C, and with the other leg, deſcribe the arch *e e*. *Laſtly*, Draw the lines BD and DC, and it will complete the equilateral triangle BCD required.

PROB. XII. *Fig.* 12. *To divide a right Line given into any Number of equal Parts.*

Suppoſe the right line given be AB, and it is required to divide the ſame into ten equal parts.

Firſt, Draw another right line of any length, as CD, and ſet thereon ten equal parts, taken of any length, alſo at pleaſure.

Secondly, Take between your compaſſes that part of the line which conſiſts of thoſe ten equal parts, *viz.* from C to D, and (by the foregoing problem,) make therewith an equilateral triangle, as CDE.

Thirdly, Take between your compaſſes the length of the given line AB; and, ſetting one foot of the compaſſes in the point E, make a point on each of the two ſides of the triangle ED and EC, as at *a* and *e*, and draw the line *a e*; which will then be equal to the given line AB. *Laſtly*, In length, from thoſe diviſions on the line CD, let lines be drawn to the point E croſs the line *a e*; and the croſſings of thoſe lines will divide it into ten equal parts, as required.

PROB. XIII. *Fig.* 13. *To circumſcribe a Circle about a Square; alſo to inſcribe a Circle within a Square.*

Let ABCD be a ſquare given, about which let it be required to deſcribe a circle.

Firſt, From the oppoſite angles of the given ſquare, as from A to C, and from B to D, draw the two diagonals croſſing each other in the point *a*.

Secondly, Set one foot of the compaſſes in the point *a*, and opening the other to any of the angles of the ſquare, as from *a* to D, with that diſtance deſcribe the circle, and it ſhall touch all the four angles ABC and D; ſo have you circumſcribed a circle about a ſquare.

Again: To inſcribe a ſquare within a circle, divide one ſide of it into two equal parts, at O; then ſet one foot of the compaſſes in *a*, and, extending the other to O, deſcribe a circle with that diſtance. This circle will touch all the ſides of the ſquare, that is, will be inſcribed within the circle, as was required

PROB. XIV. *Fig.* 14. *To deſcribe a Circle that ſhall paſs through any three given Points that are not in a ſtrait Line, as* ABC.

Firſt, Upon the points A and B, with any opening of the compaſſes, deſcribe two arches to interſect each other, as at *a* and *e*; *Secondly*, On the points AC deſcribe two more arches to interſect each other in the points *c c;* draw the lines *a e* and *c c*, and where theſe two lines interſect, as at *o*, place one foot of the compaſſes, and extend the other to any of the three given points AB, or C, and with the diſtance deſcribe the circle ABC, and it will paſs through the three given points, as required.

PROB. XV. *Fig.* 15. *To inſcribe the largeſt Circle poſſible within a Triangle.*

Let ABC be a triangle given, within which let it be required to inſcribe the largeſt circle that may be, which ſhall touch all the three ſides thereof.

Firſt, Divide any two of the angles of the triangle into two equal parts, as the angles A B C, by the line C *a* and A *e*, cutting each other in the point *o*, ſo ſhall *o* be a centre; upon which if you deſcribe a circle to touch the three ſides of the triangle, no larger circle can be deſcribed therein.

PROB. XVI. *Fig.* 16. *To find the Side of any regular Polygon, not exceeding ten ſides, (as in Definition* 9,*) that this is to be inſcribed, in any given Circle, as* ACBD.

Firſt, Through the centre O, draw the diameter AB, dividing the circle into two equal parts.

Secondly, Take in your compaſſes half the diameter AO or OB, and ſetting one foot in A, with the other make the marks K and L, and draw the line KL, which ſhall be the ſide of a triangle that will be inſcribed in that circle.

Thirdly, Draw the line CD, through the centre O, cutting the diameter AB at right angles, and draw the line AC, which ſhall be the ſide of a ſquare that will be inſcribed in that circle.

Fourthly, Set one foot of the compaſſes in G, and extend the other to C, and draw the arch-line C E; then draw the right line CE, and that will be the ſide of a pentagon inſcribed within the circle.

Fifthly, Any of the ſemidiameters AO, O B, O C, or O D, are the ſides of a hexagon, or figure of ſix ſides, that may be inſcribed in the circle.

Sixthly, Half of the line K L, namely, K G or L G, is the ſide of a heptagon, or ſeven-ſided figure, inſcribed in that circle.

Seventhly, Divide the line AC, into two equal parts in F, and draw the line OFI; cutting the circumference of the circle in I, ſo ſhall a line drawn from A to I, be the ſide of an Octagon, that may be inſcribed within the circle.

Eighthly, Divide the part of the circle LAK, into three equal parts, one third part thereof is from L to N; ſo a line drawn from L to N, ſhall be the ſide of a nonagon, or figure of nine ſides, that may be inſcribed within this circle.

Laſtly, The line OE is the ſide of a decagon, or figure of ten ſides, that may be inſcribed in this circle.

PROB. XVII. *Fig.* 17. *Two right Lines being given, to find a mean Proportional.*

Let the two lines given be B and C, and let them be joined together in one right line, as AK; divide the line AK into two equal parts, in the point G, from whence deſcribe the ſemicircle AHK; then, upon the point I, where the two lines BG were joined, erect a perpendicular IH, which will meet the ſemicircle in H; ſo ſhall the line IH be the mean proportional required.

PROB. XVIII. *Fig.* 18. *To make a Geometrical Square equal to a Triangle given.*

Let B *d* E be a triangle given, to be reduced into a geometrical ſquare.

Extend the ſide of the triangle BE to O, making EO equal to half the length of the perpendicular of the triangle AC. *Secondly*, Divide the line BO into two equal parts in K, and, with the diſtance KB, deſcribe the ſemicircle BHO. Upon E erect the perpendicular EH, meeting the ſemicircle in H; ſo ſhall EH be the ſide of a geometrical ſquare, equal to the triangle B *d* E.

Prob. XIX. *Fig.* 19. *To make a Geometrical Square equal in Area to a Parallelogram.*

Let the long ſquare AEIO be given to be reduced into a geometrical ſquare, containing the ſame quantity or area.

Firſt, Continue the ſide IO of the long ſquare to Q; making OQ equal to OE the ſhorteſt ſide of the long ſquare.

Secondly, Divide the line IQ into two equal parts in F, upon which point F, with the diſtance FI or QF, deſcribe the ſemicircle of IBQ, and continue the ſide OE to B; ſo ſhall BO be the ſide of a geometrical ſquare BCOP, which ſhall be equal in quantity to the long ſquare AEIO.

Prob. XX. *Fig.* 20. *To make a Geometrical Square, equal in Quantity to two Geometrical Squares given.*

Let the two geometrical ſquares given be A and B.

Firſt, Draw the line CF, and equal in length to one ſide of the largeſt given ſquare A; raiſe the perpendicular line EF, equal in length to one ſide of the ſmalleſt given ſquare B. *Secondly*, Draw the diagonal line CE; ſo is CE the ſide of the geometrical ſquare CEGO, which is equal in quantity to the two given ſquares A and B.

PROB. XXI. *Fig.* 21. *To make an equilateral Triangle equal to two given equilateral Triangles.*

Let the two given equilateral triangles be A and B.

Firſt, Draw a right line CD equal in length to one ſide of the given triangle B. Erect the perpendicular line DE, equal in length to one ſide of the given triangle A.

Laſtly, Draw the diagonal line CF, and therewith, (by Prob. XI.) complete the equilateral triangle CEF, which ſhall be equal in quantity to the two given equilateral triangles A and B.

PROB. XXII. *Fig.* 22. *Two Circles being given, to make another Circle to contain the ſame Quantity.*

Let the two circles given be F and G.

Firſt, Upon the diameter of the largeſt of the two given circles at the point D, erect the perpendicular line DE, equal in length to the diameter AB of the leaſt given circle.

Laſtly, Draw the line BE, and divide it into two equal parts in O; take with your compaſſes the diſtance from B to O, or from O to E, and, ſetting one foot of the compaſſes in the point O, deſcribe a circle. This circle will be equal in quantity to the two given circles F and G.

PROB. XXIII. *Fig.* 23. *To make a Square, not having one to make it by.*

Firſt, Draw a right line BC, which divide into equal parts in the point D; and upon D, with the diſtance BD, deſcribe the ſemicircle BFC.

Secondly, In any part of the circumference thereof make a point, as at F; from which point two right lines being drawn to B and C, they ſhall conſtitute a ſquare, or right angle, at the point F; and ſo two pieces of wood ſo framed ſhall be a true ſquare.

PROB. XXIV. *Fig* 24. *Of Ellipſis, and the various Ways of deſcribing them.*

Firſt, To deſcribe an ellipſis to any given length, without regard to breadth.

Let AB be the given length. Divide it into three equal parts, as A *s t* B. Then with the radius A *s*, deſcribe the circle AF *o t n* C; and from *t*, the circle BD *n s o e*.

Secondly, Lay a ruler from *n* to *s*, and draw *n* F at pleaſure; alſo from *n* to *t*, and draw *n e* at pleaſure. Again from *o* to *s* draw *o* C, and from *o* to *t* draw *o* D.

Then, with the radius *n* F, on *n* deſcribe the arch F *e*; and on *o*, the arch CD; which completes the ellipſis or oval required.

But as the ſhorteſt diameter is oftentimes limited as well as the longeſt, I will therefore ſhew you two ways of operating in that caſe.

PROB. XXV. *Fig.* 25. PLATE II. *To deſcribe an Oval to any Length and Breadth given.*

Let the longeſt diameter given be the line F, and the ſhorteſt G.

Firſt, Make AB equal to F, and CD to G, dividing AB equally at right angles in *a*.

Secondly, Make AO equal to DC, and dividing OB into three equal parts; ſet off two of thoſe parts from *a* to *b*, and from *a* to *c*; then, with the diſtance *c b*, make the two equilateral triangles *c d b*, and *c e b*, whoſe angles are the centres, and the ſides being continued are the lines of direction for the ſeveral arches of the oval AI, CF, BG, DH.

Note, Whereas carpenters, bricklayers, and maſons, &c. are oftentimes obliged to work an architrave, &c. about windows, of this form, they may, by the help of the four centres *c d b e*, and the lines of direction *h d*, *e f*, *d g*, *e i*, deſcribe another arch-line round the former, and at any diſtance required, as *h i f g*.

PROB. XXVI. *Fig.* 26. *To deſcribe an Oval to any Length and Breadth required, another Way.*

Let it be required to deſcribe the oval CEDF, whoſe longeſt diameters ſhall be equal to the given line A, and ſhorteſt to the given line B.

Firſt, Draw the line CD equal in length to A; alſo EF equal in length to B, and at right angles with CD.

Secondly, Take the diſtance CO, or OD, and with it from the point E and F deſcribe the arches *h* and *f* upon the diameter CD.

Laſtly, Strike in a nail or pin at *h*, and at *f*, the interſections of thoſe arches with the line CD, and put a thread or ſtring round them, of ſuch a length that the two ends may juſt reach to E or F. Hold theſe two ends tight between your fingers, with a black-lead pencil, (or other thing proper to mark with between them,) and thoſe two ends being carried round will cauſe the pencil to deſcribe the oval or ellipſis EDFC.

Prob. XXVII. *Fig.* 27. *To deſcribe an Oval, or Ellipſis, to any Length and Breadth given, another Way by the Interſection of Lines.*

Firſt, Draw the line AB equal in length to the longeſt diameter given, and thereon deſcribe a circle; alſo, on the ſame centre C, deſcribe another circle equal to the ſhorteſt diameter.

Secondly, Divide the outer circle into any number of parts, the more the better, as here into 24; and carrying a ruler through each of thoſe diviſions to the centre C, you may divide the inner circle into the like number of parts.

Laſtly, Drawing parallels to the diameters from the inner circle, and perpendiculars from the outward, their points of meeting will form the ellipſis, or oval, required.

Prob. XXVIII. *Fig.* 28. *To find the Centre and the two Diameters of an Oval.*

Let ABCD be the oval propoſed, whoſe centre and diameters are to be found.

Draw at pleaſure the two parallel lines QG, MO, biſect them in the points HN; draw the line PE, and biſect it in K; and upon K, as a centre, deſcribe a circle at pleaſure as, FLR, cutting the oval in the points FL; draw the right line FL; biſect it in I, and through the points IK draw the greateſt diameter AC: Through the centre K draw the leaſt diameter BD parallel to the line FL, and you have what was required.

PROB. XXIX. *Fig.* 29. *To draw a ſpiral Line about a given right Line, as* AC.

Divide half the right line AC into as many equal parts as there are to be revolutions, as here, into four.

Divide the half AI into four equal parts IKGH. Divide alſo IK into two equal parts in B. Upon the point B deſcribe the ſemicircles KI, GF, HE, AD; upon the point I deſcribe the ſemicircles KF, GE, HD, AC; and you will have the ſpiral line required.

PROB. XXX. *Fig.* 30. *Upon a given right Line to deſcribe any Polygon from a Pentagon to a Duodecagon; that is, from a Figure of five ſides to a Figure of twelve Sides.*

Let AB be a line given, upon which a pentagon, &c. is to be made.

Biſect the line AB in Q, and erect the perpendicular QP. From the point A deſcribe the arch BH, and from B the arch AH, and divide BH into ſix equal parts, as H 1, 12, 23, 34, 45, 5 B.

This done, let a pentagon be required. From the point H with the interval H 1, one of thoſe equal parts of BH, deſcribe the arch I 17, and the point I will be the centre of a circle containing the given line AB five times; the interval IB being the radius thereof. If you take the point H for the centre of another circle, and HB for the radius, this new circle will contain the line AB ſix times. From the point 7, with the radius 7 B, a circle drawn will contain AB ſeven times.

Again: From the ſame point H, with the interval H 2, which makes two of the equal parts of BH, deſcribe the arch 2 8; and from the point 8, with the radius 8 B, you may draw a circle in which AB ſhall be the ſide of an octagon. From 9, with the radius 9 B, you form a nine-ſided figure. From 10, a ten-ſided figure; and ſo on to 12.

Prob. XXXI. *Fig.* 31. *To deſcribe a Scheme Arch, the Baſe and Perpendicular being given.*

Firſt, Draw the line AB, and biſect it at right angles by the line *c f*, and from *g* to *c* ſet on the right of the arch, and draw the line *c* B; then, from the middle thereof, erect a perpendicular line, as *e d*, ſo as to cut the perpendicular line *c f*; and the interſection is the centre for deſcribing the arch required

Prob. XXXII. *Fig.* 32. *Another Way, by the Interſection of Lines.*

Firſt, Draw the baſe-line AB, and biſect, or middle it, at *c*, from whence erect a perpendicular *c d*, equal in length to twice the height of the arch required, and draw the lines A *d* and *d* B, and divide each line into any number of equal parts, as here into 10, and drawing right lines to every correſpondent diviſion, as from 1 to 1, 2 to 2, &c. the interſection of thoſe lines will form the arch A *e* B; which was to be done.

PROB. XXXIII. *Fig.* 33. *To deſcribe an Arch of equal Height to a Semicircle, but a greater Length on the Baſe.*

Let AB *c* be a ſemicircle, and *d g* the length of the baſe given for the arch to riſe equal to the ſemicircle. Through the centre of the arch A *c* B, at *e*, draw the line *c e f*, at right angles to AB; and, to any length at pleaſure, from the points *c* and *g*, taking for your interval any lines longer than what you may judge half the diſtance between thoſe points amounts to, deſcribe two arches on either hand, cutting each other in *a* and *i*, draw a line ſo as to cut the perpendicular line *c f* at O; and O is the centre for the arch *d c g*, as required.

PROB. XXXIV. *Fig.* 34. *To deſcribe an elliptic Arch on the ſhorteſt Diameter.*

Firſt, Draw the diameter A B, and, on the middle thereof, at *k*, erect the perpendicular *k o*, equal to the height of the arch; divide the perpendicular *k o*, into two equal parts at *e*; continue out the line A B on both ſides at pleaſure, and from the point *k*, ſet on the length of *k o*, as at *c* and *d*; through the points *c e*, *d e*, draw the lines *c e f*, and *d e g*, to a length at pleaſure; and *d* and *c* are centres for the arches A *g* and B *f*; and *e* the centre for the arch *g o f*, which will form the arch required.

PROB. XXXV. *Fig.* 35. *To draw a Gothic Arch.*

Take between your compaſſes the length of the line A B, and on the points A and B, deſcribe the arches A *c* and B *d*, and it will complete the Gothic arch required.

Prob. XXXVI. *Fig.* 36. *To deſcribe the Gothic Arch of another Form.*

Divide the line A B into three equal parts; at *c d* B, take between your compaſſes the diſtance of two of theſe parts; and on the points *c* and *d* deſcribe the arches A *e* and B *e*, and you have your deſire.

Prob. XXXVII. *Fig.* 37. *Another Form.*

Divide the line A B alſo into three equal parts, at *e f* B; from the points A and B, let fall alſo the perpendicular lines A *c* and B *d*, equal in length to two of the diviſions of the line A B; draw the lines *c h* and *d g*; from the points *e f*, with the length of *f* B, deſcribe the arches A *g* and B *h*; and, from the points *c d*, deſcribe the arches *g i*, and *i h*, and it will complete another Gothic arch.

Prob. XXXVIII. *Fig.* 38. *Another Form.*

As before, divide the line AB into three equal parts, as A *a*, *a b*, *b* B; and, on the points A, *a*, *b*, B, with the diſtance of two diviſions, make four arches interſecting at *c d*. Through the interſecting points *c d*, and the diviſions *a b*, draw the lines *c f* and *d e*; and on the points *a* and *b* deſcribe the arches A *e* and B *f*; and on the points *c* and *d*, the arches *e g*, and *f g*, and it will complete another Gothic arch.

Prob. XXXIX. *Fig.* 39. *To find the Angle of a regular Groin, or the Miter Bracket of a Cove.*

Cov

Firſt, Deſcribe the form of the cove intended, as E A B, then the plan of the angle, or miter, as the line BC. Divide the projection,

Covering

or baſe-line, BD, into any parts, equal or unequal, any how, and, raiſing perpendiculars to touch the moulding of the cove, extend alſo thoſe lines to cut the miter, or angle, BC; from thence raiſe perpendiculars, ſetting on them the length of each correſpondent line, from the baſe line to the cove, as 1, 2, 3, &c. This done, if you trace by hand, or ſtick in nails in the points, and bend a thin lath round them, and ſtrike by its edge, you will have formed the mould for the angle-bracket required.

N. B. This method will ſerve, let the given arch EB be what it will, ellipſis, ogee, &c.; or let the angle be a right angle, or acute, or obtuſe.

Prob. XL. *Fig.* 40. *To make the different Centres for regular or irregular Groins, ſo that their Miters ſhall be true.*

Firſt, Lay down the plan of the vault, room, &c. as 1, 2, 3, 4, and draw the diagonals at the end from the arch, as here a ſemicircle A; (and, as in the laſt problem) ſo in this, divide the baſe-line 1 3 into any number of parts, or any how, and continue the lines to touch the arch and the diagonal 1 4, and from the interſections of the diagonal 1 4 raiſe perpendiculars: Alſo, from the ſaid interſections, raiſe perpendiculars to the ſide 3 4, then, (as before in the laſt problem,) ſetting off each correſpondent length, you will form the centres B and C required, the lines *a b*, *c d*, *e f*, and all the correſpondent perpendiculars being equal; then tracing, or ſticking in nails, and bending a lath round the points, you draw the arches required.

Prob. XLI. *Fig.* 41. *To raiſe a Perpendicular from a given Point, at the End of a right Line, equal in Height to a given right Line by the Help of the Tee-ſquare and Drawing-Board.*

Let the height of the perpendicular line be equal to the line EF.

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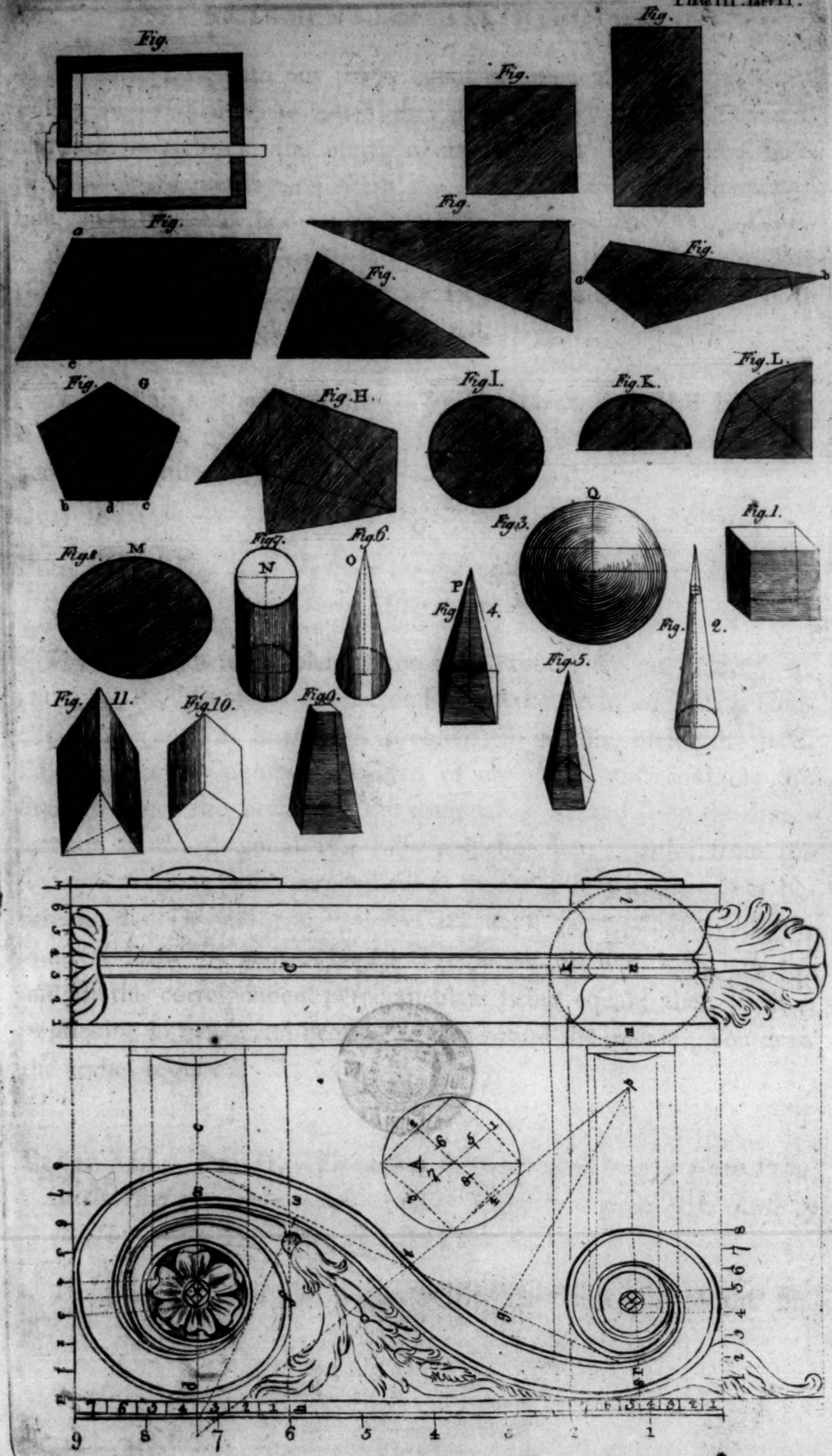
Plate III^d Part II^d



Firſt, Faſten on your paper on the drawing-board with ſealing-wax at the four corners, and then apply your tee-ſquare to any ſide of the drawing-board, as HI, and, by its edge, draw a line on the paper at pleaſure, as *a c*, and let the point *d* be the given point. Take between your compaſſes the length of the given line EF, the height of the perpendicular required; then applying your tee-ſquare to the other ſide of your draught-board GH, ſlide its edge until it lyes over the given point *d*; ſet one foot of the compaſſes in the point *d*, and, cloſe to the edge of the ſquare, with the other foot make a prick, as at *e*. Draw the line *d e*, which is the perpendicular required.

Here *note*, That if your draught-board is not truly ſquare at its angles GHIK, and the ſides as truly ſtrait as can be, the work will be falſe.

C H A P. III.

Meaſuring of Superficial PLAINS.

BY meaſuring of plains, is meant the finding the area, or content of ſuperficial figures, ſuch as four-ſided figures, triangles, circles, &c. But, becauſe the uſual way of taking dimenſions is by feet and inches, we ſhall firſt ſhew how to multiply feet and inches by feet and inches, before coming to particular examples in meaſuring.

Example I. Let it be required to multiply 11 foot 4 inches, by 7 foot 5 inches. Place the numbers to be multiplied, in order one under another, viz. feet under feet, inches under inches;

making a croſs between the feet and inches, and drawing a line under them as in the margin.

Feet.		*Inches.*
11	X	4
7		5

The product of 11 foot by 7 foot, is———77———0
The product of 5 inches by 11 foot, is———4———7
The product of 4 inches by 7 foot, is———2———4
The product of 5 inches by 4 inches, is——— 1—8

The total product, or content, is———84———0———8

For the better underſtanding the foregoing example, and all other queſtions of the like nature, obſerve the following rules, viz.

1. That if feet are multiplied by feet, the product is feet.

2. If inches are multiplied into feet, every 12 of the product is 1 foot; and any number leſs than 12 is inches.

3. If inches are multiplied into inches, every 12 of the product is 1 inch; and any number leſs than 12 are parts of an inch.

4. If parts of an inch are multiplied by feet, every 12 of the product is 1 inch, and any number leſs than 11 are parts of an inch.

5. If parts of an inch are multiplied by inches, every 12 of the product is 1 part, and any number leſs than 12 are ſeconds.

6. If parts of an inch are multiplied by parts, every 12 of the product is 1 ſecond; and any number leſs than 12 are thirds.

EXAMP. II. Let it be required to multiply 15 foot 6 inches and a quarter, by 12 foot 8 inches and three quarters.

And here *note*, That as a foot contains 12 inches line-meaſure, ſo an inch is ſuppoſed, or accounted, to contain 12 parts line-meaſure; and each part to contain 12 ſeconds; and each ſecond to contain 12 thirds; and each third to contain 12 fourths, &c. And ſo the proportion might be continued, if there were occaſion, to fifths, ſixths, &c.

Alſo obſerve, that each place of twelfths is diſtinguiſhed by having a letter put over it; thus, over the feet write F, over inches I, over parts P, over ſeconds S, over the thirds T, &c.; as in this example.

Set down your dimenſions, as in the margin, and read it thus; 15 foot, 6 inches, and 3 parts of twelve, which is the ¼ inch; by 12 foot, 8 inches, and 9 parts of 12, which is the ¾ of an inch. Multiply the 15 foot by the 12, or elſe take but one figure at a time, ſaying, twice 15 is 30, and once 15 is - - -

	F.	I.	P.	S.	T.
	15	6	3	0	0
	12	8	9	0	0
	30	0	0	0	0
	150	0	0	0	0
The product of 8 inches by 15 foot, is 120 inches, which divided by 12 is	10	0	0	0	0
The product of 6 inches, by 12 foot, is	6	0	0	0	0
The product of 8 inches, by 6 inches, is 48 inches, which divided by 12, is	0	4	0	0	0
The product of 3 parts by 12 foot is 36, which divided by 12, is —	0	3	0	0	0
The product of 9 parts by 15 foot is 135, which divided by 12, is —	0	11	3	0	0
The product of 3 parts by 8 inches is 24, which divided by 12, is —	0	0	2	0	0
The product of 9 parts by 6 inches is 54, which divided by 12, is —	0	0	4	6	0
The product of 3 parts by 9 parts is 27, which divided by 12, is —	0	0	0	2	3
The total product is — —	197	6	9	8	3

Note, That in caſting up the ſum, you muſt carry 1 for every 12 to the next denomination.

Thus you will ſee the area, or content, of 15 foot 6 inches and a quarter, or 3 parts of 12 in length, multiplied by 12 foot 8 inches and three quarters, (or 9 parts in 12) in breadth, is 197 foot, 6 inches, and 9 parts of an inch, accounted to have 12 parts and 8 of one of thoſe parts; and 3 of one of thoſe ſeconds. But theſe ſeconds and thirds are not worth the ſetting down or taking notice of, the value of thoſe parts being ſo ſmall.

Having now ſhewn you how to multiply feet and inches, by feet and inches, &c. we ſhall proceed to the meaſuring of ſuperficies and ſolids. And, *firſt*, of ſuperficies.

PROB. I. Plate 3. *To meaſure a Square, and a Parallelogram, or long Square, as the Figures* A *and* B, *whoſe four Angles are all right.*

RULE. Multiply one ſide by the other, and the product is the area required.

PROB. II. *To find the Content of a Trapezium, two ſides whereof are parallel, as Fig.* C.

RULE. Add the two parallel ſides together, whereof take half the ſum for the length; multiply that by the perpendicular *a e*, and the product is the content required.

PROB. III. *To Meaſure any triangle, as the Figures* D *and* E.

RULE. Multiply the longeſt ſide (which is uſually called the baſe) by half the perpendicular let fall from the angle oppoſite to the baſe, which is the pricked line, and the product is the content required.

Prop. IV. *To find the Content of a Trapezium, as the Figure* F.

Rule. Draw the diagonal line *a b*, which divides the trapezium into two triangles; next draw the two perpendicular lines *e d*: Then take the half of the ſum of the two perpendiculars when added together for your breadth, and the line *a b* for your length, and multiply them, and the product is the content.

Prop. V. *To find the Area, or Content, of a Pentagon, as the Fig.* G.

Rule. From the centre *a* draw the lines *a b* and *a c*, and let fall the perpendicular *a d;* meaſure the triangle *a b c*, as before taught, and the product multiplied by 5 is the content of the pentagon required. Here you muſt note, that what is here ſaid of the menſuration of a regular pentagon, may be alſo underſtood of the menſuration of a hexagon, heptagon, octagon, &c.

Prop. VI. *To find the Content of any unequal-ſided Figure, as the Figure* H.

Rule. Divide it into triangles, marking each with an alphabetical letter, or a figure. Then, beginning with the firſt triangle, as that marked *a*, find its content, and place it down as in the table; and, in like manner, go through with the whole: Then, *laſtly*, by adding all the ſeveral triangles together, you will have the whole content of the unequal-ſided figure as required.

a	3	2	3
b	4	6	0
c	5	3	6
d	3	6	0
	16	5	9

PROP. VII. *The Diameter of a Circle being given, to find the Circumference thereof arithmetically, as Fig.* 1.

RULE. As 7 is to 22, or as 113 to 355, ſo is the diameter to the circumference.

EXAMPLE. Suppoſe the diameter given to be 12 foot, (as *fig.* 1.) it is required to find the circumference thereof.

Multiply the diameter (being 12) by 22, the product is 264, which divided by 7 brings 37 feet and $\frac{5}{7}$ of a foot for the circumference. Or multiply the diameter 12 by 355, the product is 4260, which divided by 113 brings 37 feet and $\frac{79}{113}$ of a foot for the circumference; this laſt way is the trueſt, the other makes the circumference a ſmall matter too much.

If the circumference be given, and the diameter be required, it appears, by this rule, the circumference 37 $\frac{59}{118}$ being multiplied by 113, and the product divided by 355, gives 12, the diameter.

PROP. VIII. *Fig.* 1. *The Diameter and Circumference of a Circle being given, to find the Area, or ſuperficial Content thereof, arithmetically, divers Ways.*

RULE 1. Multiply half the diameter by half the circumference, it ſhews the content of any circle.

RULE 2. Or Multiply the whole circumference by the ſemidiameter *a c*, and take half the product.

RULE 3. Or multiply the ſquare of the diameter by 11, and divide the product by 14, the quotient is the content.

PROP. IX. *Fig.* 1. *Having only the Diameter of a Circle given, to find the Content.*

RULE. Say, As 7 is to 22, ſo is the ſquare of the ſemidiameter to the content of the circle.

EXAMPLE. Let the diameter given be *a b*, (as *fig.* 1.)

Multiply the ſquare of the ſemidiameter *a c*, which is 36, by 22, and the product is 792, which divided by 7 gives $113\frac{1}{7}$ for the content required.

PROP. X. *Fig.* 1. *Having the Circumference given, to find the Content.*

RULE. As 88 (which is four times 22) is to 7, ſo is the ſquare of the circumference to the content.

Multiply the ſquare of the circumference by 7, and divide the product by 88, and you have the content required.

PROP. XI. *Fig.* 1. *The Content of a Circle being given, to find the Diameter.*

RULE. As 22 is to 28, ſo is the content to the ſquare of the diameter.

Multiply the content given by 28, and divide the product by 22, the ſquare-root of that quotient is the diameter ſought. Or thus, and more exactly, (by Metius's proportion,) As 355 is to 452, ſo is the content given to the ſquare of the diameter.

PROP. XII. *Fig.* I. *The Content of a Circle being given, to find th Circumference.*

RULE. As 7 is to 88, ſo is the content to the ſquare of the circumference.

Multiply the content given by 88, and divide the product by 7 and the ſquare-root of that quotient is the circumference required.

PROP. XIII. *Fig.* I. *The Content of a Circle being given, to find th Side of a Square, the Content of which Square ſhall be equal to th Content of the Circle.*

RULE. Extract the ſquare-root of the given content, and tha root is the ſide of the ſquare required.

PROP. XIV. *Fig.* I. *The Diameter of a Circle being given, to fin the ſide of a Square, the Area of which Square ſhall be equal to th Area of the Circle of the given Diameter.*

RULE. As ſeven is to 22, ſo is the ſquare of the ſemidiameter t the content required. But this proportion of Archimedes is not ſ true as that delivered by Metius; and therefore we would adviſe th reader always to make of his proportion; *viz.* As 113 is to 355, ſ is the ſquare of the ſemidiameter to the content required.

Multiply the ſquare of the ſemidiameter by 355, and divide th product by 113, it gives the ſide of the ſquare required. This content is leſs than the content produced from Archimedes's proportio conſiderably, but more exact; and the greater the diameter is, th more the difference will be.

Or thus, As 452 (which is four times 113) is to 355, ſo is the ſquare of the diameter to the content required.

Prop. XV. *The Diameter of a Circle being given, to find the Side of a Square which may be inſcribed within that Circle.*

Rule. Square the diameter, and the root of half the product is the ſide of the ſquare required.

Prop. XVI. *The Diameter and Arch-line of a Semicircle being given, to find the Area thereof.*

Let *a b c*, in *fig.* K, be a ſemicircle given, whoſe diameter is *d c*, and the arch-line *a b c*, it is required to find the area of that ſemicircle.

Rule. Multiply half the arch-line by the ſemidiameter, the product will be the content required.

Prop. XVII. *Fig.* K. *The ſemidiameter and Arch-line of a Sector of a Circle being given, to find the Area of the Sector.*

Let *b c d* be the ſector of a circle, whoſe ſemidiameter is *d c*, or *d b*, and the arch-line *b c*; and let it be required to find the area.

Rule. Multiply the ſemidiameter by half the arch-line *b c*, the product is the area required.

Prop. XVIII. *Fig.* K. *Any Segment, or Part of a Circle, being given, to find the Content.*

Let *a c b e*, be the ſegment of a circle, the content whereof is required.

RULE. *Firſt*, Find out the centre of the arch-line *a c b*, (by the XIVth Prob. of Geometry) then draw the lines *d a* and *d b*, and caſt up the whole figures *a c b d*, as in the laſt Propoſition; then find the ſuperficial content of the triangle *a d b*, and deduct the ſame out of the whole content, the remainder is the content of the given ſegment, as required.

By this rule, all manner of ſegments, or parts of a circle, whether greater or leſſer than a ſemicircle, may be eaſily meaſured.

PROP. XIX. *Fig.* K. *To find the Diameter of a Circle, by having one part of the Diameter given, alſo having the Length of the Chord croſſing the Diameter in the given Part.*

Let *c e* be the part of the diameter given; alſo, let *a b* be the given chord which cuts off the given part of the diameter; it is required to find the whole diameter arithmetically.

RULE. Square one half of the chord-line *a b*, and divide the product by the given part of the diameter *c e*, the quotient being added to the ſaid given part, is the length of the diameter required.

PROP. XX. *Any Segment of a circle being given, whoſe Chord-line doth not exceed the Chord of the Quadrant of the ſame Circle: to find the Content, without finding the Diameter, and without deſcribing any more of the Circumference. And very near the truth in ſmall Segments.*

Let the ſegment given be *fig.* L, whoſe chord-line is *a i*, and the part of the diameter cut off by the chord-line *u o*; the content of this ſegment *a o i u* is required.

RULE. Take the whole length of the chord *a i*, and $\frac{2}{3}$ of the lengths of the line *u o;* to which $\frac{2}{3}$ add $\frac{7}{12}$, then multiply thoſe two lengths, and the product gives you the content.

Note, The two little ſegments, *a o* and *o i*, are meaſured by the ſame rule.

Prop. XXI. *Fig.* M. *To find the ſuperficial Content of an Oval.*

Rule. Multiply one diameter by the other, and extract the ſquare-root of their product; that root, ſo extracted, ſhall be equal to the diameter of a circle, whoſe ſuperficial content ſhall be equal to the oval given, which may be found by Prop. VIII. for a circle.

Prop. XXII. *To find the ſuperficial Content of a Cylinder.*

Note, That a cylinder is a ſolid body, ſuch as is uſed in gardens for the rolling of walks.

Rule. As 7 to 22, or as 113 to 355, ſo is the diameter and length of the ſide, multiplied one by the other, to the ſuperficial content of the outſide of the cylinder, the two baſes, or ends, being excluded.

Examp. Let *fig.* N be a cylinder, whoſe ſuperficial content is required. Multiply the diameter by the length, and multiply that product by 355; and divide the laſt product by 113, the quotient ſhews the ſuperficial content of the cylinder required. If you work by the proportion of 7 to 22, the content will be a ſmall matter more than the former.

If you have the circumference and length of a cylinder given, and the content be required.

Multiply the circumference by the length, and the product is the ſuperficial content.

If it is required to have the ſuperficial content of the two baſes, or ends of the cylinder, you muſt find the content of them, (as is ſhewn in Prop. VIII.) and, when thoſe are found, add their ſums to the former content; and you will have the ſuperficial content of the cylinder, with the two baſes, or ends, included.

PROP. XXIII. *To find the ſuperficial Content of a Cone.*

A cone is a body which hath a circle for its baſe, from whence it diminiſheth equally, like a round ſpire of a ſteeple, till it end in a point.

Let *fig.* O be a cone, the circumference of whoſe baſe is 28 foot, and the length of the ſide 12 foot, the content of which is required

RULE. If you require the content of the whole cone, that is to ſay, the content of the baſe, as well as the content of the outſide; then multiply the whole ſide by half the circumference of the baſe; and to the product add the content of the plain of the baſe.

EXAMP. The whole circumference is 28 foot, the half thereof is 14 foot, which, being multiplied by the length 12 foot, produces 168 foot for the content of the outſide, without the baſes; then, for the content of the circle, whoſe circumference is 28, (by Prop X.) find the content thereof, and add it to the former content, and the product is the ſuperficial content of the cone, including its baſe.

	F.	
Examp. The content of the cone without its baſe is	168	
The content of the baſe is — —	63	$\frac{4}{88}$
Whole content —	231	$\frac{4}{88}$

Prop XXIV. *To find the ſuperficial Content of a Pyramid.*

As a cone hath a round baſe, and diminiſheth equally till it end in a point; ſo a pyramid hath an angular baſe of 3, 4, 5, 6, or any other number of ſides, and diminiſheth to a point at the top.

Let *fig.* P be a pyramid whoſe baſe is ſquare, and whoſe ſuperficial content is required.

Rule. Add all the four ſides of the baſe together, and take half the ſum; then multiply that half by the ſide or length, for the content required.

Note, That if the baſe be triangular, or in the form of a pentagon, &c. you muſt add all the ſides together, and take half thereof, and multiply that half into the length for the content.

Then, if you would add the content of the baſe to the content of the outſide, you muſt find the content thereof (as is before taught Prop. V.) for any of the like formed figures, and add it to the content of the outſide.

Prop. XXV. *Fig.* Q. *To find the ſuperficial Content of a Globe or Sphere.*

Rule. Multiply the diameter by the circumference, and the product will be the ſuperficial content of the round body or globe.

EXAMP. Let the diameter be 14 foot, the circumference will be 44 foot, which being multiplied one by the other, the product is 616 foot for the content of the ſuperficies of the globe.

Or find the content of a circle that hath the ſame diameter as the globe, and multiply that content by 4, and the product is the ſuperficial content required.

PROP. XXVI. *To find the ſuperficial Content of a Segment of a Globe or Sphere.*

The ſuperficies of any ſegment of a globe is the ſuperficies of the remaining portion, as the portion of the axis or diameter cut off is to the remaining portion of the ſame.

EXAMP. Let *fig.* Q be a ſegment of a globe given, *e g f*, whoſe part of the diameter is 5 foot, and the whole diameter 14 foot; and let the ſuperficial content of the circular part be required.

Say, by the *Rule of three*, If 14 gives 616, what will 5 give? Multiply 616 by 5, the product is 3080; which divided by 14, gives 220 foot for the ſuperficial content of the ſegment, or part of the globe.

CHAP. IV.

Of Meaſuring SOLIDS.

BY meaſuring of ſolids, is meant the meaſuring of ſtone, timber, digging of earth, and all ſolid bodies whatſoever.

As a ſuperficies conſiſts of length and breadth, ſo a ſolid body conſiſts of length, breadth, and depth (or thickneſs.)

And as, in ſuperficies, you only multiply the length by the breadth for the content: ſo, in meaſuring of ſolids, you muſt firſt multiply the breadth by the length for the gaining the ſuperficial content; and then multiply that product by the depth of the ſolid body, and the product is the ſolid content.

PROP. I. *fig.* 1. PLATE III. *To find the ſolid Content of a Cube; as in* fig. 1. *being a Cube* 12 *Inches in Length,* 12 *Inches in Breadth, and* 12 *Inches in Depth, whoſe ſolid Content is required.*

Firſt, Multiply 12 inches, the length by 12 inches, the breadth, and the product is 144 inches for the ſuperficial content; this multiplied by 12 inches, the depth, produces 1728 inches for the ſolid content of that cube, which is one ſolid foot.

EXAMP.

	Inches.
The length	12
The breadth	12
	24
	12
The ſuperficial content is	144
Which multiplied by the depth	12
	288
	144
The ſolid content required	1728

PROP. II. *Fig.* 2. *To meaſure the ſolid Content of a long Cube, or Parallelopepidon, as* fig. 2.

EXAMP. Suppoſe the parallelopepidon given be 6 foot long, 10 inches wide, and 7 inches in depth, what is the content?

Multiply 6 foot, the length, by 10 inches the breadth, the product is 60. *Secondly*, Multiply this product by 7 inches the depth, which gives 420. *Thirdly*, Multiply this laſt product by 12, and divide the product thereof by 1728, (the cubical inches in a ſolid foot, and it gives 2 feet and $\frac{1584}{1728}$ for the content.——*See the work.*

The length	6	feet
The breadth	10	inches
	60	
The depth	7	inches
	420	
	12	inches
	840	
	420	
The inches in a ſolid foot 1728)	5040	(2 feet
	3456	
The inches in a quarter foot 432)	1584	(3 quarters 288 inch.
	1296	
Remainder	288	inches.

PROP. III. *Fig.* 3. *To meaſure the ſolid Content of a Priſm, or triangular Solid.*

RULE. *Firſt*, Find the ſuperficial content of one end, (which is a triangle, as is taught before in ſuperficies,) then multiply that content by the length, and the product is the ſolidity required.

PROP. IV. *Fig.* 4. *To meaſure the ſolid Content of a ſtrait Piece of Timber or Stone, terminated at both Ends with two equal Pentagons.*

RULE. *Firſt*, Find the ſuperficial content of the pentagon, as before is taught in ſuperficies, and multiply that content by the length, and the product is the ſolid content required.

PROP. V. *Fig.* 5. *To meaſure the ſolid Content of a ſtrait Piece of Timber, or Stone, that is ſquared, being bigger at one End than the other.*

RULE. *Firſt*, Find the content of the biggeſt end; *ſecondly*, Find the content of the leſſer end; *thirdly*, Multiply one content by the other; *fourthly*, From that product extract the ſquare-root; *fifthly*, Add this ſquare-root, and the content of both ends, into one ſum; *ſixthly*, Multiply this ſum by one third part of the length, and the product is the ſolid content required.

PROP. VI. *To meaſure the ſolid Content of a Pyramid, whoſe Baſe is an equilateral Triangle, or a Square, or in the form of a Pentagon, as* fig. 6.; *alſo, to find the Content of a Cone.*

RULE. *Firſt*, Find the ſuperficial content of their baſes, (as is taught before, for any of the like formed figures in ſuperficies,) and multiply that content by one third part of the height, and the product is the content required.

PROP. VII. *To find the ſold Content of a Cylinder, as Fig.* N.

By a cylinder is meant ſuch a *like* ſolid as is uſed in gardens for the rolling of walks. To meaſure which ſolid, *Firſt*, Find the content of the baſe, (as before taught;) which content being multiplied by the length of the cylinder, the product is the content required.

PROP. VIII. *To meaſure the Segment of a Cone, which may well be repreſented by a Tree that grows taper or diminiſhing, as Fig. 7.*

RULE. For finding the content of ſuch a formed figure, you muſt have recourſe to the Rule delivered in the Fifth Propoſition hereof: For the ſame rule that ſerves for tapered ſquare timber, ſerves alſo for round timber, or bodies whoſe baſes or circles, at the ends, are unequal.

PROP. IX. *Let Fig.* Q *be a Sphere or Globe, whoſe axis* a b *is* 12 *Feet: What is the Solid Content thereof?*

RULE. As 21 is to 11, or as 42 to 22; ſo is the cube of the diameter or axis of the ſolid content required.

EXAMP.		Feet.
The axis is 12, and the ſquare of it is	—	144
Which multiply by the axis	—	12
The cube of the axis is	—	1728

Then ſay, by the Rule of Three, If 21 give 11, what will (the cube of the diameter) 1728 give?

Place the numbers in order thus—21 11 1728

Multiply the third number by the ſecond number 11, and divide the product by the firſt number 21, and the quotient is 905 feet and $\frac{3}{12}$ of a foot, the content required.

$$\begin{array}{r} 1728 \\ 11 \\ \hline 1728 \\ 1728 \\ \hline \end{array} \text{ Feet.}$$

$$21)19008(905\tfrac{3}{12}$$

$$\begin{array}{r} 189 \\ \hline 108 \\ 105 \\ \hline 3 \end{array}$$

Prop. X. *Fig.* Q. *The ſolid Content of a Globe or Sphere being given, to find the Diameter or Axis.*

Rule. As 22 is to 42, ſo is the ſolid content given to the cube of the diameter, whoſe length is required.

Examp. Multiply the given content by 42, and divide the product by 22, the cube-root of the quotient is the diameter ſought.

Prop. XI. *Suppoſe, in Fig.* Q, e g f *were the Segment of a Sphere, what is the ſolid Content thereof?*

Rule. *Firſt*, Increaſe the altitude of the other ſegment not given by half the axis.

Then ſay, by the Rule of Three, As the altitude of the other ſegment not given, is to the height of the given ſegment *g* 5, ſo is the altitude of the other ſegment 5 *h*, to a fourth proportional.

Secondly, Square half the chord-line *ef*, and multiply the ſquare of that half chord by the fourth proportional found by the firſt work.

Then ſay by the Rule of Three, As 21 is to 22; ſo is the product of the ſquare of half the chord of the given ſegment, multiplied by the fourth proportional (found as above) to the ſolid content of the given ſegment *egf*.

CHAP. V.

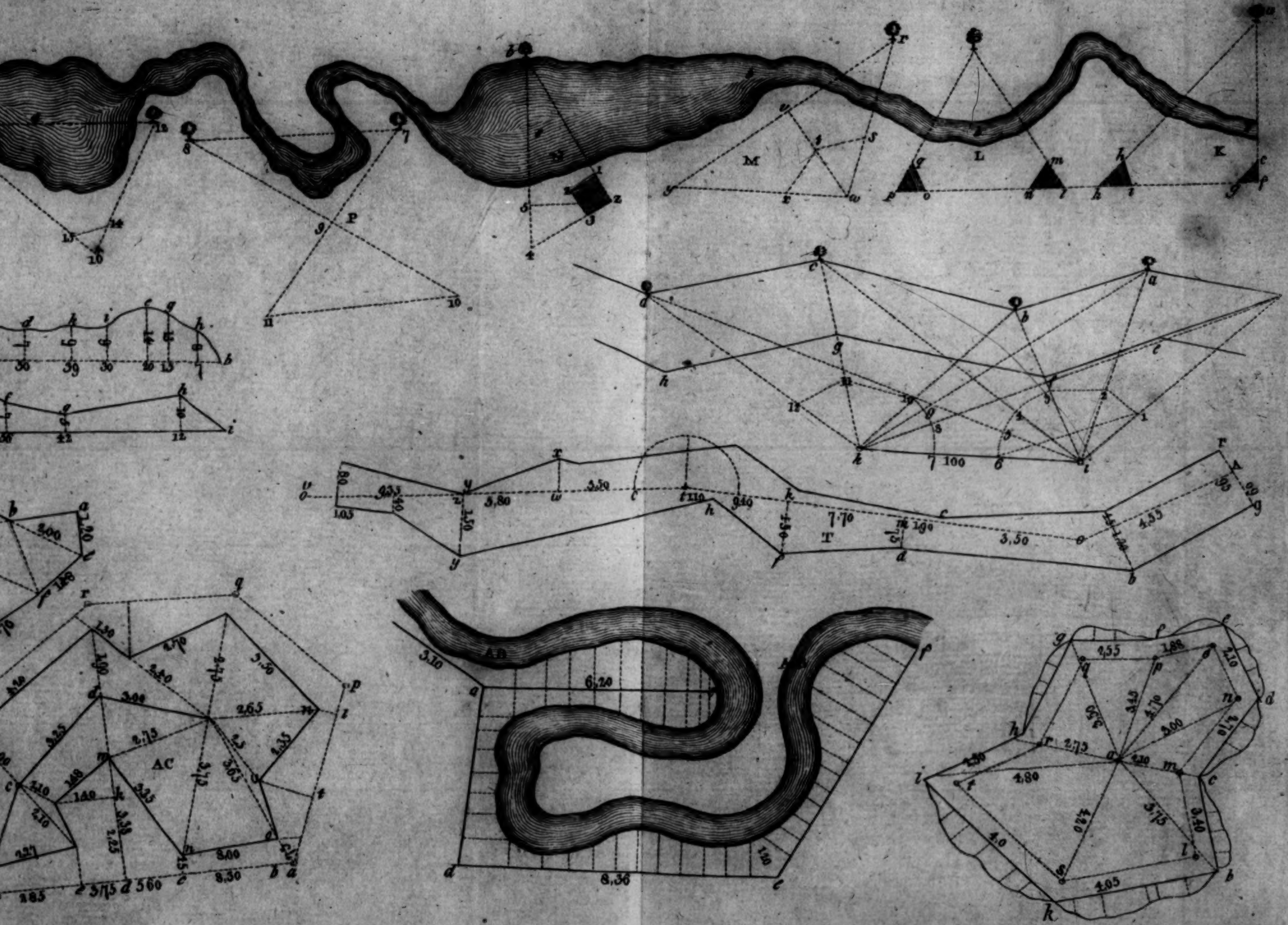
Of PLAIN TRIGONOMETRY,

Geometrically performed.

Of the Solution of PLAIN TRIANGLES.

1. *Definitions.* PLATE D.

FIRST, Plain Triangles are right-angled, or oblique-angled. *Secondly*, A right-angled triangle is ſuch a triangle as hath one right angle, and two acute angles, as the triangle A, Plate D, whoſe angle *b c a* is a right angle, and the angles *c b a*, and *b a c*, are both acute angles. *Thirdly*, An oblique triangle is ſuch a triangle as hath one obtuſe angle, and two acute angles, as the triangle B, whoſe angle *b c a* is obtuſe, and the angles *c b a*, and *c a b*, are both acute angles. *Fourthly*, In every right-angled plain triangle, that ſide which ſubtendeth, (or is oppoſite to) the right angle, as *b a*, in figure A, is called the *hypothenuſe;* and of the other two ſides, the one, as *c a*, is called the *baſe*; and the other, as *c b*, is called the *perpendicular*. *Fifthly*, In every oblique plain triangle, as *fig*. C, the longeſt ſide is generally called the *baſe*, as *c a*; but ſometimes one of the other two ſides is made the baſe. *Sixthly*, In every right-lined triangle, the ſum of the degrees contained in the three angles, are equal to 180 degrees; therefore, if you have any two angles given, you have alſo the third given, it being the compliment to 180 degrees. *Seventhly*, And as, in a right-angled plain triangle, the right angle contains 90 degrees; therefore, if any one of the two acute angles late D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Plane Trigonometry

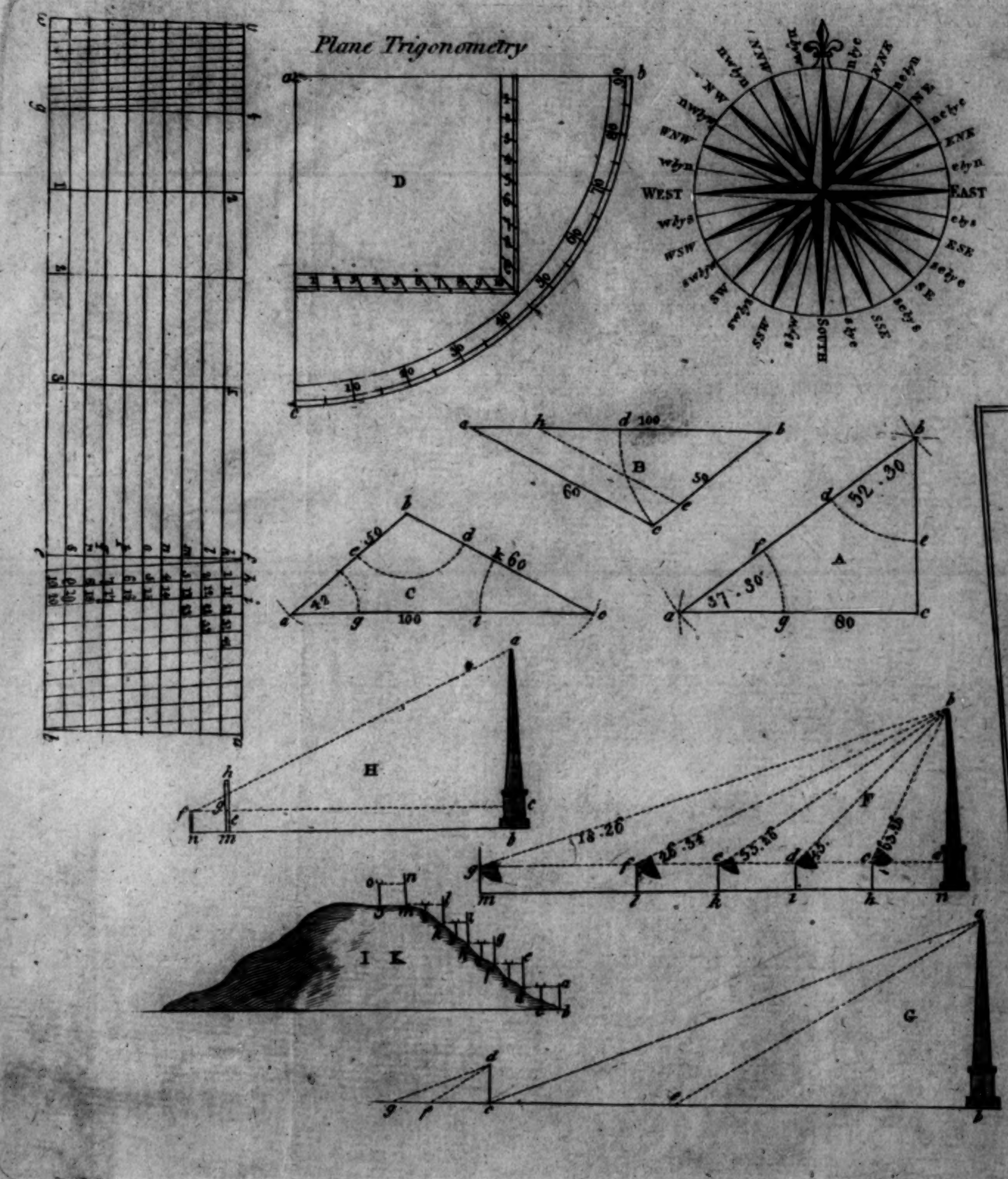
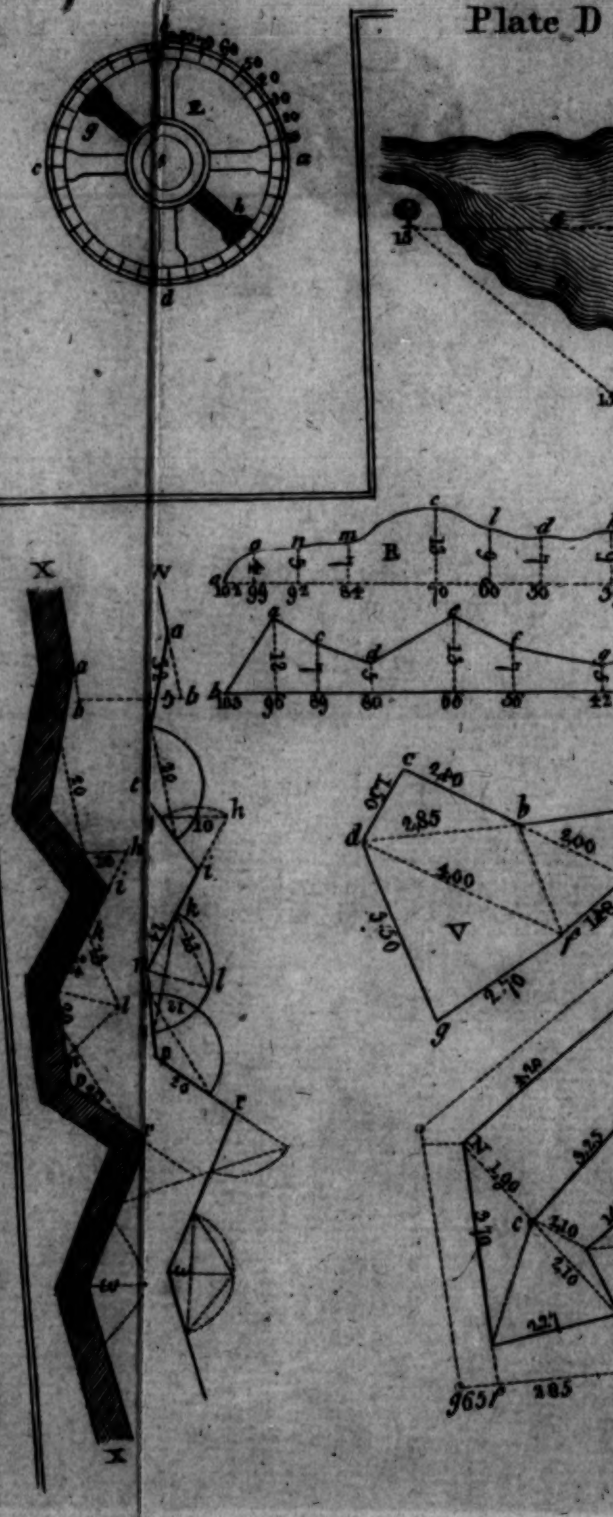


Plate D



be given, the other acute is alſo given; becauſe it is the complement of the other acute angle to 90 degrees; or of the other acute angle and right angle to 180 degrees. *Eightly*, In all plain triangles whatſoever, the ſides are proportional to the ſides of their oppoſite angles.

The ſolution of plain triangles has always conſiſted of 12 caſes, but herein we have reduced them unto 8 caſes, of which 4 are of triangles right-angled, and 4 of triangles oblique; and which anſwer every particular exactly the ſame as thoſe of other authors divided into 12 caſes.

I. *Of right-angled plain Triangles.*

In the ſolution of right-angled plain triangles, there are always two parts given, as two ſides; or an angle and one ſide; to find a ſide or an angle required.

Case I. *Fig.* P. Plate D. *The Baſe* c a 80 *Feet, and Perpendicular* c b 60 *Feet, being given, to find the acute Angles* c b a *and* b a c, *and the Hypothenuſe.*

Make *c a* (by a ſcale of feet) equal to 80 feet, and *c b*, equal to 60 feet; and draw *b a*, which is the hypothenuſe required. With 60 degrees of chords on the angular points *b* and *a*, deſcribe the arches *e d* and *g f*, which being meaſured on the ſcale of chords *e d*, will contain 52 deg. 30 min. and *g f* 37 deg. 30 min. which are the angles required.

CASE II. *Fig.* A. PLATE D. *The Hypothenuſe* b a 100 *Feet, and the Baſe* c a 80 *Feet, being given, to find the acute Angles and Perpendicular* b c.

Make *c a* equal to 80 feet; erect the perpendicular *c b* of length at pleaſure; on *a*, with the length of 100 feet, interſect the perpendicular at *b*, and draw the line *b a;* then meaſure the degrees in each angle, (as in caſe I.) and *b c* will be the perpendicular required.

CASE III. *Fig.* A. PLATE D. *The Baſe* c a 80 *Feet, and the Angle* c a b, *oppoſite to the* e *Perpendicular* 37 *Deg.* 30 *Min. being given, to find the Perpendicular* c b, *and Hypothenuſe* b a.

Make *c a* equal to 80 feet, erect the perpendicular *c b* of length at pleaſure; make the angle *b a c* equal to 37 deg. 30 min. and draw the line *a b* which will cut the perpendicular in *b*, then *b c* is the perpendicular, and *b a* is the hypothenuſe required.

CASE IV. *Fig.* A. PLATE D. *The Hypothenuſe* b a 100 *Feet, and the Angle* c b a 52 *Deg.* 30 *Min. oppoſite to the Baſe, being given, to find the Length of the Baſe* c a, *and the Perpendicular* c b.

Draw *b a* equal to 100 feet; make the angle *b a c* equal to 52 deg. 30 min. and draw *b c* of length at pleaſure; make the angle *b a c* equal to the complement of the angle *c b a*, and draw the line *a c*, which will cut *b c* in *c*; then *c a* is the baſe, and *b c* the perpendicular required.

II. *Of oblique-angled plain Triangles.*

In the ſolution of oblique-angled plain triangles, there are always three parts given, as two ſides and an angle, or two angles and a ſide, to find a ſide or an angle required.

CASE I. *Fig.* B. PLATE D. *Two Sides, and an Angle oppoſite to one of the Sides, being given, to find the third Side.*

This admits of three varieties; as,

Firſt, The baſe *b a* 100 feet, and ſide *b c* 50 feet, with the angle *b a c* 28 degrees, oppoſite to the ſide *b c*, being given, to find the ſide *c a* 60 feet.

Make *b a* equal to 100 feet; on *b*, with the length of 50 feet, deſcribe the arch *d c* at pleaſure; in any part of *b a*, as at *h*, make an angle, as *b h e*, equal to the given angle 28 degrees; from *a*, draw the line *a c* parallel to *h e*, which will cut the arch *d c* in *c*; then the line *c a* is the length of the ſide required.

Secondly, The baſe *c a*, *fig.* C 100 feet, and ſide *b a* 50 feet, with the angle *c b a* 110 degrees, oppoſite to the baſe *c a*, being given, to find the ſide *c b* 60 feet.

Make *b a* equal to 50 feet; make the angle *c b a* equal to 110 degrees, and draw *b c* of length at pleaſure; on *c*, with the length of the baſe 100 feet, interſect the line *b c* in *c*; then *c b* is the length of the ſide required.

Thirdly, The two ſides *c b* 60 feet, and *b a* 50 feet, with the angle *b c a* 28 degrees, oppoſite to the ſide *b a*, being given, to find the length of the baſe *c a* 100 feet.

Draw *c a* at pleaſure; on *c* make the angle *a c b*, equal to the given angle 28 degrees, and make *c b* equal to 60 feet; on *b*, with the length of 50 feet, interſect the line *c a* in *a*; then *c a* is the length of the baſe required.

CASE II. *Fig.* C. PLATE D. *The Baſe* c a 100 *Feet, and the Side* c b 60 *Feet, with the Angle* b c a 28 *Degrees, contained between them, to find the third Side* b a, *and the Angles* c b a *and* b a c.

Make *c a* equal to 100 feet; make the angle *b c a* equal to 28 degrees, and the ſide *c b* equal to 60 feet, draw the line *b a*, which is the third ſide required; then meaſure the angles *c b a* and *b a c*, (as in Caſe I. of right-angled plain triangles.)

CASE III. *Fig.* C. PLATE D. *The three Sides* c a 100 Feet, c b 60 *Feet, and* b a 50 *Feet, being given, to find all the Angles.*

Complete the triangle *b c a*, and (by Caſe I. of right-angled plain triangles,) find the quantity of each angle.

CASE IV. *Fig.* C. PLATE D. *Two Angles, as* b c a 28 *Degrees,* b a c 42 *Degrees, and one Side, as* c b 60 *Feet, being given, to find the other two Sides* b a 50 *Feet, and* c a 100 *Feet.*

Make *c b* equal to 60 feet; make the angle *b c a* equal to 28 degrees, and the angle *b a c* equal to 42 degrees; continue out the lines *b a* and *c a*, and they will interſect each other in the point *a*; then *c a* and *b a* are the two ſides required.

CHAP. V.

Of the MENSURATION *of* HEIGHTS *and* DISTANCES.

Plate D.

THE proper inſtruments for theſe purpoſes are a quadrant, as *fig.* D, and a ten-foot rod, chain, &c.

Prob. I. *Fig. F. To take the Height of an Object, as the Obeliſk* b n *by the Help of a Quadrant.*

Move from the object, until, looking through the ſights of the quadrant to the top of the object, the plumb-line cut 63 degrees 26 min. on the limb, as at *h*; then the height of your eye, being added to your diſtance from the central line of the object, is equal to ½ the height; or move backward until the plumb-line cut 45 deg. as at *i*, and, the height of your eye added to your diſtance, as before, the ſum is the height required: And ſo, in the like manner, moving backwards until the plumb-line cuts 33 deg. 20 min. as at *k*, then ⅔ of the diſtance is the altitude; and at *l*, where the plumb-line cuts 26 deg. 34 min. the diſtance is double the altitude.

If any obſtruction is betwixt you and the object, ſo that you cannot meaſure to its baſe; then go nearer, or farther, until the plumb-line cut 26 deg. 34 min. as at *l*, and there make a mark on the ground; move backwards in a right line with your firſt ſtation and the object, until the plumb-line cut 18 deg. 26 min. as at *m;* then the diſtance between your two ſtations *l* and *m* is equal to the altitude required.

Prob. I. *Fig.* G. **Plate D.** *To find the altitude of an Object, by knowing the Lengths of its Shadow.*

Set up a ſtick of any known length, ſuppoſe 3 feet, as *d e;* let the length of the ſhadow of the object be *b e,* and of the ſtick *e g*; then, as the length of the ſhadow of the ſtick is to the height of the ſtick, ſo is the length of the ſhadow of the object to the height of the object.

Prob. III. *Fig.* H. **Plate D.** *To take the Altitude of an Object that is acceſſible, by the Help of a ten-foot rod and a ſtick only. Let the Obeliſk* a b, *be an acceſſible Object, whoſe Altitude is required.*

Erect a ten-feet rod in any place, as at *m,* and a ſtick, as at *n f,* equal to the height of your eye, at any diſtance in a right line, equal to the height of the building; look from the top of the ſtick level to the building, and, againſt your ray of ſight, at the ten-feet rod, make a mark, as at *e;* cauſe a ſecond perſon to ſlide a piece of paper up the ten-feet rod; ſo that, looking from the top of the ſtick *f,* to *b* the top of the object, you ſee the top of the paper, as at *d,* at which place make a mark: This done, meaſure the diſtance of the two marks on the ten-feet rod *e* and *d,* alſo the diſtance *e f;* then, as *e f* is to *e d,* ſo is *e f,* the diſtance from the ſtick to the object, to *c a,* the height of the object above the level-line *c f;* to which add the height of the ſtick *n f,* and the ſum is the altitude required.

Prob. IV. *Fig.* G. **Plate D.** *To take the Altitude of an Object that is inacceſſible, by its ſhadow.*

Suppoſe the ſhadow of the object reach from *b* to *e,* and, at the ſame time, the ſhadow of a ſtaff reach from *e* to *g*; at about two or three hours after, when the ſun is riſen conſiderably higher, place down a mark at the end of the object's ſhadow, which ſuppoſe to be at *c*; alſo, at the ſame time, make a mark at the end of the ſhadow of the ſtick, ſuppoſe at *f*: Now, as the triangle *d f g* is ſimilar to the triangle *a c e;* and as the triangle *d c f* is ſimilar to the triangle *a c b;* therefore, as *f g* is to the height of the ſtaff *d e* ſo is *c e* to the height of the object required.

PROB. V. *Fig.* I K. PLATE D. *To meaſure the Altitude of a Hill or Mountain, by the Help of a Spirit-level, and Station-ſtaffs.*

(1.) Erect your level truly hoizontal on the top, as at 5, and directly againſt the inſtrument; let a ſecond perſon hold up a ſliding ſtation-ſtaff, with a vane fixed thereon, which is to move up, until, looking through the ſights of your level, you ſee its upper edge, as at *n:* This done, let the ſecond perſon write down the number of inches and parts of inches that this vane is above the ground at *m;* let a third perſon write down the inches and parts of inches that your inſtrument is above the ground at 5.

(2.) Remove your level down the hill, as at 4, and your ſecond aſſiſtant to *k*, and let your third aſſiſtant erect his ſtation-ſtaff at *m*, the place where your ſecond aſſiſtant firſt ſtood: This done, fix your inſtrument truly horizontal, and, looking to your third aſſiſtant at *m*, let him ſlide up his vane until you ſee its upper edge, at which time he is to ſet down, under the height of the inſtrument obſerved at 5, the inches and parts of inches that his vane is then above the ground; alſo, look to the ſtation-ſtaff of your ſecond aſſiſtant, and cauſe him to ſlide up his vane, until you ſee its upper edge, as at *l*, and let him place down the inches and parts of inches his vane is above the ground, under his firſt height obſerved at *m*. Proceed in like manner at every other obſervation, as may be required to deſcend unto the bottom of the hill at *b*.

(3.) Let each aſſiſtant add into one ſum the heights of their ſeveral obſervations, and then, that of your third aſſiſtant's being ſubtracted from that of your ſecond aſſiſtant's, the difference is the altitude of the hill required.

PROB. VI. *Fig.* POM. PLATE D. *To meaſure an inacceſſible Diſtance.*

Inacceſſible diſtances may be meaſured by many methods, as, *firſt*, To find the diſtance of the two trees, 7 and 8, *fig.* P, which is rendered inacceſſible by the river *b b*.

Aſſign any point on the ground, from which you can meaſure directly unto the two objects 7 and 8, as the point 9; continue 7, 9 unto 11, and 8, 9 unto 10, making the diſtance of 9, 11 equal to 7, 9 and the diſtance of 9, 10 equal to 8, 9; then the diſtance from 10 to 11 is equal to the diſtance of 7 8 required.

Secondly, To find the diſtance of the tree at *r*, in *fig.* M, from the point *v*, which is rendered inacceſſible by the river *b b*.

Imagine a line to be drawn from *v* to *r*, and thereon erect the perpendicular *v w*, of any length, and let *r v* be continued at pleaſure towards *y*, which may be done by ſtraining a packthread line from *v* towards *y*, in a right line with *v r*. In any part of the perpendicular *v w*, aſſign a point as *w*, and, at any diſtance from you, place a ſtake in a right line between *w* and *r*, as at *s*; alſo another on the perpendicular, at any diſtance from *w*, as at *t*. Make the triangle *w t x*, equal to the triangle *w s t*;

and continue *w x*, until it meet the line *v y* in *y*; then the diſtance *v y* is equal to the diſtance *v r* required.

Thirdly, To find the diſtance of the two trees 12 and 13, *fig.* O, which is rendered inacceſſible by the river *d*.

Aſſign a point at 16, from which you can meaſure to both the objects; place two ſtakes at any diſtance in right lines, from the point 16 to the two objects, as at the points 14, and 15, and meaſure the ſides of the triangle 14, 15, 16; alſo, the diſtances from the point 16 to the objects 12 and 13. On paper, with a ſcale of feet, make a triangle, whoſe reſpective ſides are equal to the meaſures of the ſides of the triangle 14, 15, 16, and continue out the ſides, reſpecting the ſides 16, 14, and 16, 15, each equal to the meaſures of 16, 12, and 16, 13; then the diſtance between the extremes of thoſe lines, being meaſured on your ſcale of feet, will be the diſtance required.

PROB. VII. *Fig.* NKL. PLATE D. *To meaſure an inacceſſible Diſtance by the Help of a Geometrical Square, right-angled or equilateral Triangle.*

Firſt, To meaſure the diſtance 5 *b*, *fig.* N, which is rendered inacceſſible by the river *c*, by the help of a geometrical ſquare.

Imagine a right line to be drawn from 5 to the object *b*, which continue towards 4. On the point 5, erect the perpendicular 5 *z*, of length at pleaſure, and therein aſſign a point as *z*, where, with a piece of board, make a geometrical ſquare; apply its angles over the point *z*, and direct its ſides *z* 1 to the object; alſo, at the ſame time, cauſe an aſſiſtant to move along the line 5 4, until, by the ſide of the geometrical ſquare z 3, you ſee his ſtation-ſtaff erect at 4. This done, meaſure the ſides of the triangle 5 z 4; and then, as the ſide 5 4, is to the perpendicular z 5, ſo is the perpendicular z 5, to 5 *b*, the diſtance required.

Secondly, To meaſure the diſtance *lk*, *fig*. L. which is rendered inacceſſible by the river *b*.

Being furniſhed with a piece of board that is an equilateral triangle, as *l m n*, apply one of its angles over the point *l*, and direct a ſide, as *l m* to *k*, and, at the ſame time, direct an aſſiſtant to fix up a ſtation-ſtaff in a direct line with the other ſide *l n*, at any diſtance from you, as at *p*, and then ſet up a mark in the point *l*. This being done, move along the line *l p*, until, by the ſides of the equilateral triangle, you can ſee both the mark ſet up at *l*, and the object at *k*, which you will do at the point *p*; then the diſtance of *l p* is equal to the diſtance *l k* required.

Note, In the ſame manner an inacceſſible diſtance, as *f a*, *fig*. K, may be found by a right-angled plain triangle, as *e f g*, whoſe ſides *e f* and *f g* are equal, as is evident to inſpection.

PROB. VIII. *Fig*. O. PLATE D. *To meaſure the Diſtance of divers Objects, that are inacceſſible at two Stations, by the help of a common ſmall Table or joint Stool, and a ſtreight Rule, with perpendicular Sights fixed at each End thereof.*

Let the ſeveral objects be *a*, *b*, *c*, *d*, and the two ſtations *i*, *k*, at 100 feet, or yards, &c. diſtance.

Being furniſhed with a ſtreight rule, about two feet, or two feet and a half in length, with perpendicular ſights ſo fixed at each end, that the ſlits of the ſights ſtand perpendicularly over the thin edge of the rule, (which is generally called *an index*,) and with a ſmall table or ſtool, that hath a ſmooth and even ſurface, proceed as follows: viz. with a ſcale of feet, &c. draw a line in the middle of the table, as *i k*, equal to 100 feet, the diſtance between the two ſtations; and then, being at one of the ſtations, as at *i*, lay the edge of the index to the line *i k*, and move the table, until, through the ſights of the index, you ſee the other ſtation *k*, and there fix your table faſt. On the point *i*, on your table, fix a pin, and, applying the edge of your index to the pin, look through the ſights to the firſt object at *a*; and draw a line from the pin by the edge of the index, at pleaſure, as *i a*; move your index, in like manner, to every one of the remaining objects, drawing lines from the pin towards each object, as at firſt. This done, remove your table unto *k*, your ſecond ſtation; and, placing the point *i* on your table, towards the firſt ſtation, lay your index to the line *k i* on your table, and move the table, until, through the ſights, you ſee your firſt ſtation, and there fix your table faſt. Fix a pin in the point *k* on your table, and then applying the ſide of the index to the pin, direct the ſights unto every one of the objects, and draw lines, as before, at the firſt ſtation, which will interſect the former in the points *a b c d*; and whoſe diſtances, (or the diſtances from the two ſtations *i* and *k*,) being meaſured on the ſame ſcale, by which the line *i k* was drawn on the table, will be the true diſtance of each object required.

Note, By the ſame method of working, the plan of any open field may be taken, if the angles are conſidered as ſo many different objects, and can be all ſeen at each ſtation.

CHAP. VI.

Of Surveying LANDS, *&c.*

THE uſual inſtruments for this purpoſe are generally the Plain Table, Theodilite, Circumferentor, and Chain; but, as the three firſt are inſtruments of great expence, beyond the reach of common workmen, for the ſake of whom this work is publiſhed, we ſhall therefore give ſome few examples to ſhew, how, by the help of a ten-foot rod or chain, and a joint ſtool or table, they may make the plan of any piece of land, that is not of very great dimenſions, with the utmoſt exactneſs.

N. B. The chain is that which is called *Gunter's Chain*, whoſe length is equal to 4 ſtatute poles, or 66 feet, divided into 100 links, each 7 inches $\frac{92}{100}$ in length.

PROB. I. *Fig.* S. PLATE D. *To make the Plan of an irregular Side of a Field, as* i h g f e d c a b.

Make on eye-draught on paper, expreſſing the ſeveral angles, and therein draw the occult line *b a*; as alſo, the ſeveral perpendicular off-ſets, 12 *h*, 42 *g*, 56 *f*, &c. This done in the field, meaſured in a right line from *i* towards *a*; and, when you come againſt the angle *h*, as at the point 12, write down, on your eye-draught, the diſtance meaſured from *i*, as alſo, the length of the off-ſet 12 *h*, which place, on the off-ſet; proceed, in like manner, to meaſure the remaining diſtances to every off-ſet, and the length of each off-ſet. This done, draw a line on paper, and, with a ſcale of feet ſet off from *i*, all the ſeveral diſtances, as *i* 12, *i* 42, *i* 56, &c. and from thoſe points erect perpendiculars, making each equal to their reſpective meaſures in the eye-draught; and then right lines, as *i h*, *h g*, *g f*, &c. being drawn from *i* to *h* from *h* to *g*, and from *g* to *f*, &c. they will be the plan of the irregular ſide of the field, *a*, required.

Note, If the ſide of the field be curved, as *fig.* R, then take offſets, at every remarkable bending, as at *h*, *g*, *e*, *i*, *k*, &c. which meaſure and plan, as before, and through their extremes, trace the curve, as required.

Prob. II. *Fig.* V. Plate D. *To make the Plan of a Field by the Help of a Chain only, as fig.* a c d g f e.

Make an eye-draught of the field, and divide it into triangles; meaſure the ſides of the field, and of every imaginary triangle, which place on each reſpective ſide, with a diagonal ſcale of chains and links, as expreſſed by *fig.* IV. Plate D, delineate all the ſeveral triangles, as repreſented in your eye-draught, and they will complete the plan of the field as required.

Prob. III. *Fig.* V. Plate D. *To make the Plan of an irregular curved Field, by the Help of the Chain only, as* b c d e f g h i k.

Firſt, Fix up marks, ſuch as pieces of paper fixed into the ſlit-ends of ſticks, at proper places, as *b*, *c*, *d*, *e*, *f*, *g*, *h*, *i*, *k*, and imagine lines to be drawn from one to the other, as *b c*, *c d*, *d e*, *e f*, &c. aſſign a ſtation towards the middle of the field, as at *a*, and imagine right lines to be drawn from thence, unto the ſeveral marks at *b*, *c*, *d*, *e*, *f*, &c. which will divide the whole into imaginary triangles. Make an eye-draught, as before directed, expreſſing every triangle, &c.

By Prob. II. hereof, meaſure and delineate the ſeveral triangles;

and by Prob. I. meaſure and delineate the off-ſets on the out-lines of the ſeveral triangles neceſſary for deſcribing the curved boundaries, which will complete the whole, as required.

Note, Chains and links are thus written, *viz.* 3 chains, 75 links, as from *b* to *a*; thus, 3, 75; and 2 chains, and 10 links, as, from *c* to *a*; thus, 2, 10, &c.

PROB. IV. *Fig.* AC. PLATE D. *To make the Plan of a Field, whoſe Angles cannot be all ſeen under three Stations, as at* a d c, *by Help of a Table and Chains.*

Aſſign three ſtations in the field, as *a d c*, at any diſtance, ſuppoſe *a d*, as 3 chains diſtance, and *d c* at three chains and 35 links; draw a line on your table by your ſcale of chains and links, to repreſent 3 chains, the diſtance between the ſtations *a*; and *d*; place your table in the field over the ſtationary point *a*; and, laying your index on the line *a d*, move the table about, until you ſee the ſtation *d*, and there make your table faſt; fix a pin in your table at the point *a*; and, laying your index thereto, direct the ſights to the ſeveral angles *m*, *n*, *o*, *v*, *w*, *x* 3, and draw right lines from the pin towards each angle; meaſure the diſtances from your ſtation *a*, unto every one of the angles; and, from your ſcale of chains and links ſet from the pin, on each line, as *a m*, *a n*, *a o*, *a v*, &c. their reſpective lengths, as 2, 75; 3, 75; 3, 65; &c. and draw the lines *m n*, *n o*, *o v*, *v w*, *w x*, and *x* 3; move your table to the ſecond ſtation *d*; and, laying your index on the line *a d*, move the table about until, through the ſights, you ſee your firſt ſtation at *a*, and there make it faſt; fix a pin in your table at the point *d*; and, laying your index to the pin, turn it about until, through the ſights, you ſee your third ſtation at *c*; and, by the ſide of the index, draw the line *d c*, which make equal to

3 chains 25 links, the diſtance of the third ſtation *c* from *d*; alſo, from the pin on the table, direct the index to the angle *y*, and draw the line *d y* equal to its meaſured length, and join the ſide 3 *y*; remove your table to *c* the third ſtation; lay the index on the line *d c*, and move the table about, till, thro' the ſights, you ſee the ſtation *d*, and there make it faſt; fix a pin in your table at the point *c*; and, laying your index thereto, direct the ſight to the angles *z*, *h*, *i*, *l*, and draw lines towards each angle, equal to their reſpective meaſures from the ſtation *c*, then the right lines *y z*, *z h*, *h i*, *i l*, and *l m*, being drawn, they will complete the plan, as required.

PROB. V. *Fig.* A C. PLATE D. *To make the Plan of a Field, by going about it, without Side, by Help of a Table and Chain.*

Firſt, Go about the field, and at proper diſtances make choice of ſtations, as at *a*, *p*, *q*, *r*, *s*, *g*, whereat fix up ſticks with paper as aforeſaid; then, beginning at any one ſtation, as at *a*, meaſure the diſtance from *a* to *g*; and from *a* to *p*, draw a line on one ſide of your table, on which, ſet from your ſcale of chains and links, the length from *a* to *g*; place your table over the point *a*; lay your index on the line, repreſenting the line *a g*, and move the table about until, through the ſights, you ſee the mark at *g*, and there make it faſt; fix a pin in your table at the point *a*; and, laying your index to the pin, direct the ſight to the mark at *p*, and by its ſide draw the line *a p* equal to its length before meaſured. By Prob. I. hereof, on the line *a g*, meaſure and delineate the off-ſets *b o*, *c n*, *d m*; alſo, the off-ſet *k l*, from the off-ſet *d m*, then *e i*, and *f h*; alſo, the off-ſet *t v*, and *i w*, on the line *a p*. Through the extremes of the aforeſaid off-ſets, draw the lines *w v*, *v o*, *o n*, *n m*, *m l*, *l i*, and *i h*.

Move your table over *p*, and, laying the index on the line *p a*, move your table about until, through the ſights, you ſee the mark at *a*, and there make it faſt. Fix a pin in your table at the point *p*, and laying your index to the pin, direct the ſight to the mark *q*, and by its ſide draw the line *p q*, which make equal to the diſtance that the mark at *q* is from the ſtation at *p*. Meaſure and delineate the off-ſet *q x*, and draw the line *w x*. Repeat theſe operations at the ſtations *q*, *r*, *s*, and you will complete the whole, as required.

Note, By the ſame rule, the plan of a field may be made by going about it within ſide, as ſignified in *fig*. Y, by the ſtationary diſtances, *s*, *l*, *m*, *n*, *o*, *q*, *r*, *t*, *s*.

PROB. VI. *Fig*. T. PLATE D. *To make the Plan of an incloſed Road*, *Street*, &c.

Firſt, Make choice of proper ſtations, as at *s*, *t* and *v*, at which places fix up marks as aforeſaid; meaſure the diſtance *t s*, and *t v*; draw a line on your table to repreſent the line *t v*, on which, from your ſcale of chains and links, ſet its meaſured length, place your table over the ſtationary point *t*, and laying the index to the line *t v*, move the table about until, through the ſights, you ſee the mark at *v*, and there make it faſt. Fix a pin in your table at the point *t*, and laying the index to the pin, direct the ſights to the mark at *s*; and by its ſide draw the line *t s* equal to its meaſured length.

By Prob. I. hereof, meaſure and delineate an off-ſet againſt every angle contained in the two ſides of the road or ſtreet; and right lines, being drawn to their extremes, will be the plan of the road or ſtreet, as required.

Prob. VIII. *Fig.* **XX.** **Plate D.** *To make the Plan of an irregular Wall, by the Help of a Ten-foot Rod only.*

Firſt, Make an eye-draught as WW, and thereon ſet down the length of every reſpective ſide contained in XX, and then proceed to meaſure the angles following, *viz.*

(1.) To meaſure the angle X *ae*: Imagine the ſide X *a* to be continued 10 feet, as from *a* to *b*; alſo, ſet 10 feet from *a* to *c*, and meaſure the diſtance *bc*, which ſuppoſe to be 5 feet; place the meaſures of this angle on your eye-draught, as at *a*, *b*, *c*, (2.) To meaſure the angle *a e i*: Set 10 feet on each ſide the angular point *e*, as at *d* and *f*, and meaſure the line *f d*, which ſuppoſe to be 20 feet; place theſe meaſures on the eye-draught, as at *d*, *e*, *f*. Proceed in like manner to take the meaſures of all the remaining angles, as *i*, *m*, *p*, *r*, *w*, &c.

To delineate the Plan from the Eye-draught.

Make W *a*, equal to 21 feet, the length of X *a*, on *a*, in *fig.* **W.** with a radius equal to 10 feet of your ſcale, by which you delineate the plan. Deſcribe an arch, as *b c*; make *b c* equal to 5 feet, and, thro' the point *c*, draw *b c* equal to 5 feet, and, thro' the point *c*, draw *a e* equal to 32 feet, the length of the ſide *a e*. On the point *e*, with a radius of 10 feet, deſcribe the arch *df*, and therein ſet 20 feet from *d* to *f*. Through the point *f*, draw the line *e i*, equal to 23 feet, the length of the ſide *e i*. Proceed to deſcribe the remaining angles and ſides in the ſame manner, which will complete the plan, as required.

PROB. IX. *Fig,* AB. PLATE D. *To make the Plan of a Serpentine River.*

Firſt, Aſſign ſtationary diſtances, as *f*, *e*, *d*, *a*, *c*, *b*, and fix up marks as aforeſaid. Make an eye draught of the whole; meaſure the ſtationary diſtances, and ſet their meaſures on their reſpective places on the eye-draught. Draw a line on your table to repreſent the line *a b*, which, by your ſcale of equal parts, make equal to 3 chains, 20 min. its meaſured length. Place your table over the ſtationary point *a*. Lay your index to the line *a b* on your table, and move the table about until, through the ſights, you ſee the mark at *b*, and there fix your table faſt. Fix a pin in your table on the point *a*; apply your index to the pin, and direct the ſights, firſt to *c*, and then to *d*, drawing lines on the table towards the ſtationary marks *c* and *d*, which, by your ſcale of chains and links, make equal to their reſpective meaſured lengths; *viz.* *c a*, 6 chains, 20 links, and *a d*, 4 chains, 75 links. (By Prob. I. hereof,) meaſure and delineate proper off-ſets; and through their extremes trace the curvature of the river. Remove your table to the ſtation *d*, ſetting up a mark again at *a*. Lay the index on the line repreſenting the line *a d*; move the table about until, thro' the ſights, you ſee the mark at *a*, and make the table faſt. Fix a pin in the table, at the point *d*; apply the index to the pin, and, directing the ſights to the ſtation *e*, draw the line *d e*, which make equal to 8 chains, 36 links, its meaſured length. Then, (by Prob. I. hereof,) meaſure and delineate the off-ſets to the ſide of the river, which are here deſcribed by dotted lines, and through their extremes trace on the curvature of the river. Remove your table on the ſtation *e*, and, repeating the ſame kind of operation, as at *d*, you will complete the whole, as required.

Note, When the weather is dry, you may ſeal down a ſheet of paper ſmooth on the table, and make your plans thereon; but if the weather be moiſt or wet, the paper will not do, nor indeed ſo well as the table in dry weather; becauſe the paper is always ſhrinking or ſwelling very ſenſibly, as the temperature of the air is more or leſs dry, which the table does not in ſo great a degree.

PROB. X. *To find the Quantities of Lands, in Acres, Roods, and Poles, whoſe Dimenſions are taken by* Gunter's *Chain.*

RULE. Place your dimenſions, and multiply them together, in decimal multiplication, as in the margin. From the product cut off 5 figures to the right hand, the remains to the left, if any, are acres. Multiply the five figures, cut off by 4, the roods in an acre; and from its product cut off 5 figures to the right, as before; the remains to the left, if any, are roods. Multiply the laſt five figures cut off, by the 40, the poles in a rood, and from the product cut off five figures to the right, the remains, if any, to the left, are poles. So, in this Example, the product is 110 acres, 1 rood, and 36 poles, which is thus written,

A. R. P.
110 1 36

27 92
39 57
———
195 44
1396 0
25128
8376
Acres 110)47944
———
4
—
Roods 1)91776
40
—
Poles 36)71040

THE END.

DIRECTIONS to the Bookbinder for placing the PLATES.

PART I.	PLATES 1. and 2. facing page	2.
	3. and 4.	5.
	5. and 6.	6.
	7. and 8.	7.
	9. and 10.	8.
	11.	9.
	12.	11.
	13.	17.
	14.	19.
	15.	21.
	16. 17. 18. and 19.	23.
	20.	25.
	21.	27.
	22. and 23.	30.
	24.	31.
	25. and 26.	33.
	27.	35.
	28.	39.
	29.	45.
	30.	56.
	31. and 32.	61.
	33.	63.
PART II.	PLATE 1. and 2.	69.
	Plate 3.	89.
	Plate D.	109.

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EXPLANATIONS

OF THE

Following Twenty-Four DESIGNS.

DESIGN I.

Fig. 1. Sunk Story.

IIII The Servant's Entry
D The Servant's Hall
F The Houſe-keeper's Room
CEB Servant's Room
A Wine or Ale Cellar
HG Kitchen and Landry

Fig. 2. Principal Story.

A The Lobby
K The principal Entry
G Dining-room
FH Bed-rooms
CB Ditto
ED Ditto
II Arches over the entries to the Stair-Caſes

Fig. 3. Lodging Story.

F Bed-room
G Study
H Bed-room
I Ditto
D Cloſet
E Bed-room
C Bed-cloſet, or Cloſet to the Bed-room E
A Bed-room

DESIGN II.

Fig. 1. Ground Story.

DD The Paſſage
A The Lobby and Entry to the Stair-caſe
C Servant's Room
F Dining-room
G Houſe-keeper's Room
B Larder
E Servant's Room
K Kitchen
I Bake-houſe
H Scullery
L Coach-houſe
M Stable

Fig. 2. Principal Story.

A The Landing and Entry to the Stair-caſe
C Landry
D Cloſet to ditto
E Bed-room
F Drawing-room
G Bed-room
B Bed-room

Fig. 3. Lodging Story.

A The landing from the ſtair
N The Nurſery
P Bed-room
Q Cloſet to ditto
M Bed-room
L Cloſet to ditto
G Bed-room
H Cloſet to ditto
D Bed room
C Cloſet to ditto
FIKRB Cloſets entering from the paſſage to the Rooms

DESIGN III.

Fig. 1. Halfſunk Story.

A The Servant's Entry
B Bed-room
C Ditto
D Ditto
E Houſe-keeper's Room
F Kitchen

Fig. 2. Principal Story.

A Principal Entry
B Parlour
C Bed-room
D Ditto
E Dining-room
F Drawing-room

Fig. 3. Lodging Story.

A Bed-room
B Ditto
C Ditto
D Ditto
E Ditto
F Bed-cloſet

DESIGN IV.

Fig. 1. Half ſunk Story.

A Servant's Entry and paſſage to the Apartments
E Kitchen
M Scullery
H Cloſet of the Kitchen
B Houſe-keeper's Room
G Ale Cellar
C Larder
D Servant's Room
F Ditto, with a Cloſet
L Wine Cellar
K Servant's Entry to the Stair

Fig 2. Principal Story.

A B Principal Entry and Lobby
C Parlour
D Bed-room
E Dining-room
F Bed-room
G Bed-room of the Parlour

Fig. 3. Lodging Story.

A The landing from the Stair and Lobby
B Bed-room
C Bed-room
D Ditto
F Cloſet of ditto
E Bed-room
G Cloſet of ditto

DESIGN V.

Fig. 1. Half ſunk Story.

D Servant's Entry
B Kitchen
F Scullery
C Servant's Room
E Wine Cellar
A Houſe-keeper's Room

Fig. 2 Principal Story.

A Principal Entry
F The Lobby
C Parlour
D Bed-room
B Dining-room
E Bed-room

Fig. 3. Lodging Story.

A Bed-room
E Cloſet to A
D Bed-room
C Ditto
B Ditto

DESIGN VI.

Fig. 1. Half ſunk Story.

M Servant's Entry and Paſſage
C Kitchen
D Houſe-keeper's Room
PO Cloſets of ditto
HI Preſſes
EL Ale and Coal Cellars
F Servant's Room
A Landry
H Scullery
K Wine-cellar

Fig. 2. Principal Story.

A The principal Entry
B The Veſtable
D Dining-room
E Drawing-room
F Bed-room
C Ditto

Fig 3. Lodging Story.

D Landing from the Stair
B Bed-room
A Ditto
C Bed-cloſet
G Bed-room
F Ditto
E Ditto

Note, As the Dining-room and Drawing-room of this Deſign are conſiderably higher in the roof than the rooms F and C, this occaſions the apartments immediately above them to be coomceil'd.

DESIGN VII.

Fig. 1. Ground Story.

A The Principal Entry
C Parlour
B Bed-room
H Bed-cloſet
F Landry
E Houſe-keeper's Room
O Cloſet of ditto
D Cloſet of the Parlour
P Servant's Entry
I Covered Paſſage to the Kitchen
L The Kitchen
K Scullery
M Covered Paſſage to the other Pavilion
N Servant's Room

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Fig. 2. Principal Story.
A Dining-room
B Bed-room
C Ditto
E Ditto
D Ditto
FF The Paſſage lighted from the Roof

Fig. 3. Lodging Story.
A Bed-room
F Cloſet to ditto
B Study
G Bed-cloſet to ditto
C Bed-room
D Ditto
E Ditto

DESIGN VIII.

This Deſign conſiſts of two ſmall Houſes

House I.

Fig. 1. Ground Story.
H The Door
B The Kitchen
C The Parlour

Fig. 2. Upper Story.
G Bed-room and Cloſet
F Dining-room and Cloſet

House II.

Fig. 1. Ground. Story.
I Door to the other Houſe
A Parlour
F Kitchen
G Scullery
D Dining-room and Cloſet

Fig. 2. Upper Story.
A Bed-room and Cloſet
DB Ditto
CE Ditto

DESIGN IX.

Fig. 1. Ground Story.
D Entry to the lower Story
C Parlour
B Bed-cloſet
A Kitchen
E Coal-houſe

Fig. 2. Upper Story.
B The Entry from the Stair
C Bed-room
A Dining-room

DESIGN X.

Fig. 1. Ground Story.
A The Lobby
B Parlour
C Dining-room
D The Kitchen
E Bed-room*
F Ditto

Fig 2. Lodging Story.
B Landing from the Stair
AC Bed-rooms
DE Bed-rooms

Fig. 3. Garret.
A The landing
EB Bed-room lighted from the Roof
DC Bed-rooms

DESIGN XI.

Fig. 1. Half ſunk Story.
A Servant's Entry
EF Paſſage to the apartments
HI The Kitchen and Cloſet
G Scullery
I Houſe-keeper's Room
K Cloſet to ditto
E Landry
CB Servant's Room & Cloſet.
D Cloſet of the Paſſage
L The Wine-cellar
M Ale ditto
N Coal Vault

Fig. 2. Principal Story.
A The Lobby
G Parlour
C Cloſet of ditto
D Cloſet
B Dining-room
H Cloſet of ditto
E Bed room
F Cloſet of ditto

Fig. 3. Lodging Story.
A The Paſſage to the Rooms
F Bed-room
G Cloſet to ditto
C Bed-room
B Ditto
E Ditto

DESIGN XII.

FIG. 1. Ground Story.

A	Lobby & principal Entry
B	Parlour
D	Servant's Hall
KC	Houſe-keeper's Room & Cloſet
F	Landry
GH	Private Entry and Stair
I	Kitchen

FIG. 2. Principal Story.

A	The Landing
C	The Landing of the private Stair
F	The Dining-room
B	Bed-room
D	Ditto
E	Ditto

FIG. 3. Lodging Story.

A	The Landing
B	Bed-room
EF	Ditto and Cloſet
G	Cloſet
D	Bed-room and Cloſet
C	Ditto ditto
L	Bed-room
H	Bed-room
IK	Cloſets to the Bed-rooms L and M

DESIGN XIII.

FIG. 1. Half ſunk Story.

A	The Servant's Entry
E	Houſe-keeper's Room
ID	Kitchen and Cloſet
H	Outer-room
F	Bed-room
B	Cloſet
C	Servant's Room
G	Cloſet

FIG. 2. Principal Story.

A	The principal Entry
B	The Parlour
C	Bed-room entering from ditto
F	Bed-room
E	Dining-room
D	Bed-room
H	Cloſet to ditto
G	Cloſet of the Lobby

FIG. 3. Lodging Story.

A	The landing and paſſage to the Rooms
G	Cloſet of ditto
H	Bed-room
FD	Ditto and Cloſet
BE	Ditto and ditto
C	Ditto and ditto

DESIGN XIV.

FIG. 1. Ground Story.

A	The Lobby
B	Bed-room
C	Parlour
E	Kitchen
F	Cloſet to ditto
D	Dining-room

FIG. 2. Lodging Story.

A	Landing from the Stair
B	Bed-room
D	Ditto
C	Ditto
FE	Ditto ditto
G	Cloſet to F

DESIGN XV.

FIG. 1. Ground Story.

A	The Lobby and principal Entry
C	Parlour
B	Bed-room
F	Kitchen
E	Scullery
G	Bed-room
D	Servant's Entry

FIG. 2. Lodging Story.

A	Landing-place
BI	Dining-room and Cloſet
CF	Bed-room and Cloſet
GE	Ditto and ditto
D	Garret-ſtair
HK	Bed-room and Cloſet

DESIGN XVI.

Fig. 1.	Half ſunk Story.	A	Servant's Entry
		B	Kitchen
		C	Scullery
		D	Servant's Room
		H	Landry
		F	Cloſet
		G	Larder
Fig. 2.	Principal Story.	A	The Landing
		B	Parlour
		C	Bed room
		D	Ditto
		F	Dining-room
		G	Bed-room
		E	Cloſet
Fig. 3.	Lodging Story.	A	Landing
		B	Bed-room
		C	Ditto
		D	Ditto and Cloſet
		E	Ditto and ditto

DESIGN XVII.

Fig. 1	Half ſunk Story.	A	Wine Cellar
		E	Kitchen
		I	Servant's Entry
		D	Houſe-keeper's Room
		G	Cloſet
		B	Landry
		C	Larder
		F	Servant's Room
Fig. 2.	Principal Story.	A	The Lobby
		B	Parlour
		D	Dining-room
		E	Bed-room
		C	Ditto
		F	Cloſet
Fig. 3.	Lodging Story.	I	Landing
		ED	Bed-room and Cloſet
		BC	Ditto and ditto
		FG	Ditto and ditto
		AH	Ditto and ditto

DESIGN XVIII.

Fig. 1.	Ground Story.	A	The Entry
		BG	Parlour and Cloſet
		CF	Kitchen and Scullery
		DE	Bed-room
		KI	Ditto and ditto
Fig. 2.	Principal Story.	A	Landing from the Stair
		C	Dining-room
		B	Drawing-room
		E	Cloſet to either Room
		DH	Bed-room and Cloſet
		FG	Ditto and Ditto

Fig. 3. Garret Story, conſiſting of ſeven apartments & two Cloſets.

DESIGN XIX.

Fig. 1.	Sunk Story.	E	Servant's Entry
		A	Kitchen
		BC	Cellars
		D	Scullery
Fig. 2.	Principal Story.	A	Principal Entry
		B	Dining-room
		C	Parlour
		D	Bed-room

Fig. 3. Lodging Story, conſiſting of 5 Bed-rooms and 3 Cloſets

DESIGN XX.

Fig. 1.	Ground Story.	A	The principal Entry
		B	Parlour
		G	Houſe-keeper's Room
		D	Landry
		FC	Servant's Bed-Room
		E	Kitchen
Fig. 2.	Principal Story.	A	The landing from the Stair
		B	Dining-room
		C	Cloſet to ditto
		D	Bed-room
		E	Ditto
Fig. 3.	Lodging Story.	A	The Landing from the Stair
		BCDE	Bed-rooms
		F	Cloſet to D

DESIGN XXI.

Fig. 1. Sunk Story.
A Servant's Entry
C Kitchen
B Houſe-keeper's Room
DE Servant's bed-places

Fig. 2. Principal Story.
A The principal Entry
B Bed room
D Ditto
C Dining-room

Fig. 3. Lodging Story.
A Landing from the Stair
BCDE Bed-rooms, with Cloſets to each

DESIGN XXII.

Fig. 1. Sunk Story.
A Servant's Entry
B Kitchen
DEC Bed-rooms
E Wine-cellar

Fig. 2. Principal Story.
A The principal Entry
B Parlour
C Dining-room
DE Bed-rooms

Fig. 3. Lodging Story.
A The landing from the Stair
CDE Bed-rooms
B Drawing-room

DESIGN XXIII.

Fig. 1. Ground Story.
A The principal Entry
B Parlour
F Dining-room
G Bed-room of ditto
H Cloſet
E Bed-room
D Servant's Bed-room
C Kitchen

Fig. 2. Principal Story.
A The Landing from the Stair
BCDEF Bed-rooms
G Cloſet of B
H Study

Fig. 3. Lodging Story.
A The Landing-place
EFB Bed-rooms
GH Cloſets to F and B
CD Cloſets to B

DESIGN XXIV.

Fig. 1. A Dining-room
B Parlour
C The Lobby
D Bed-room
E Cloſet
F Scullery
G Kitchen
H Paſſage

Fig 2. A Cloſet
B Bed-room
C Ditto ditto
D Ditto ditto
E Ditto ditto.

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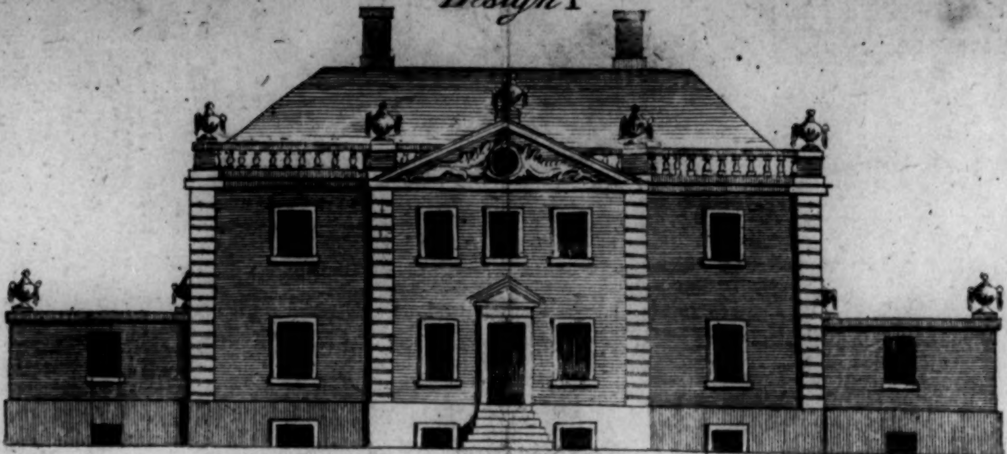
Design I



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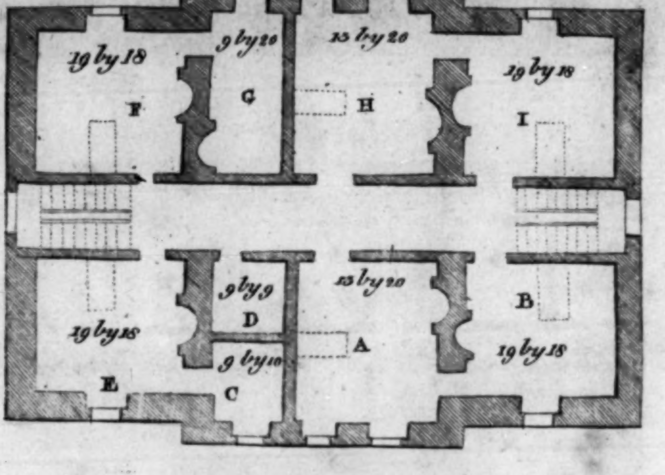

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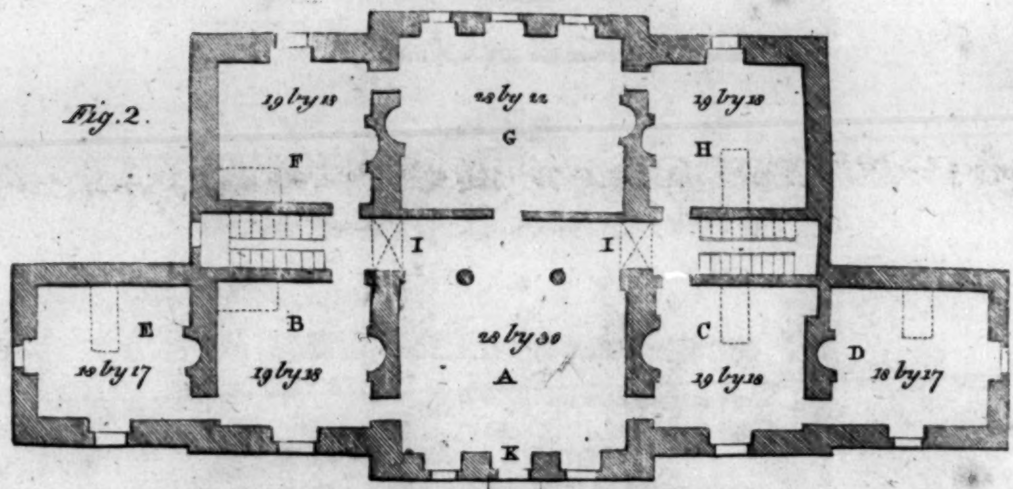

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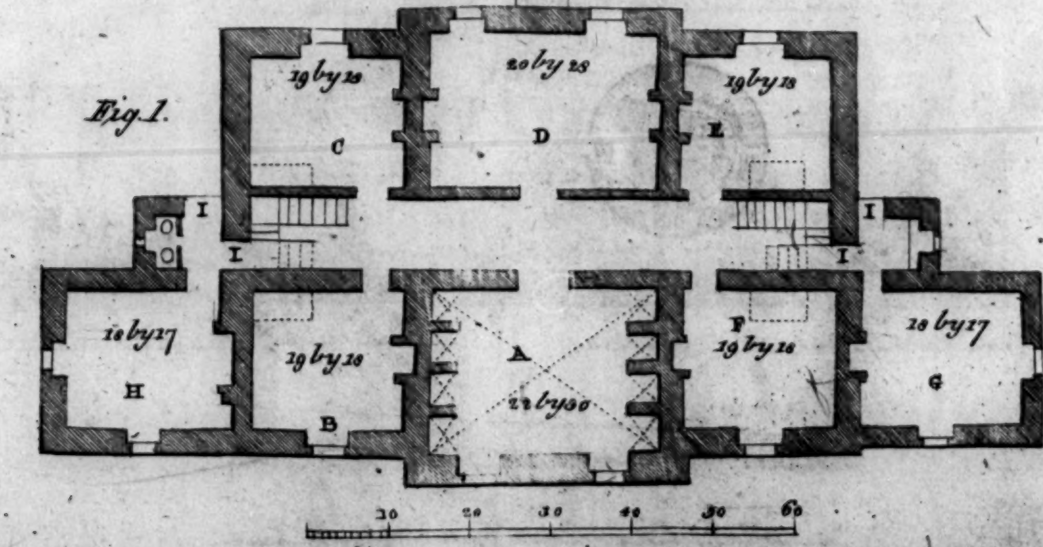

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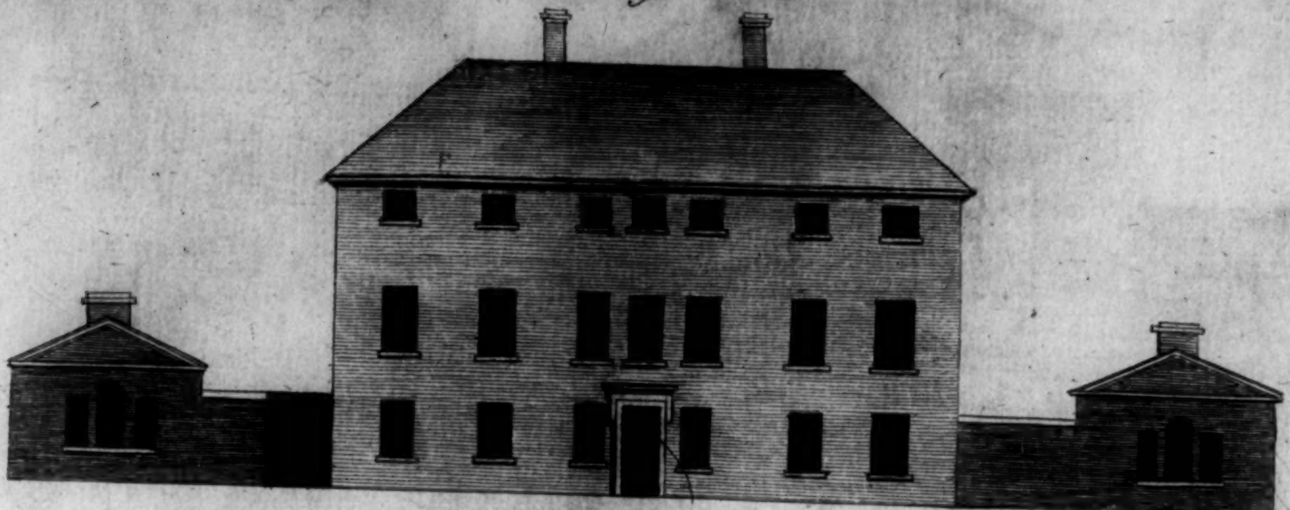
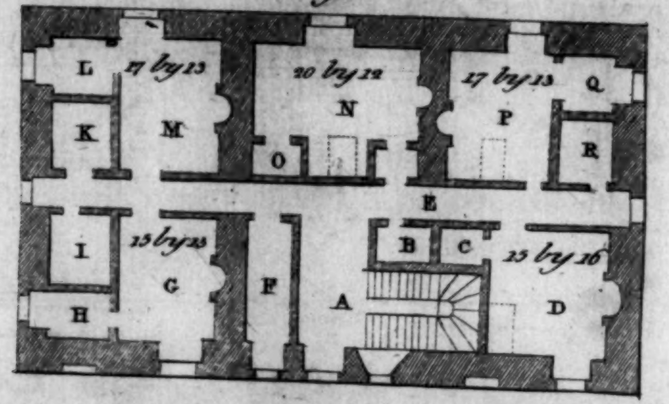


Extends 136 Feet

Fig. 3.



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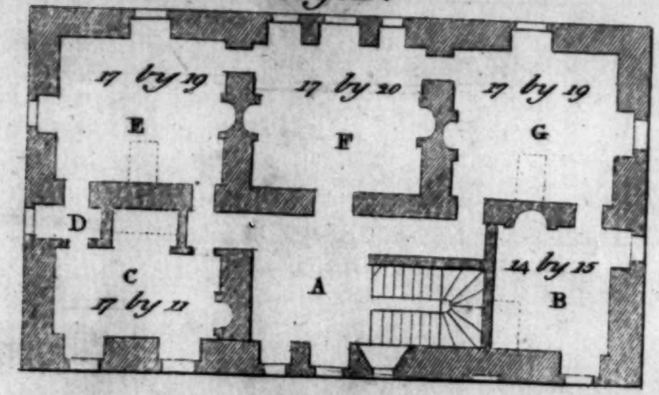

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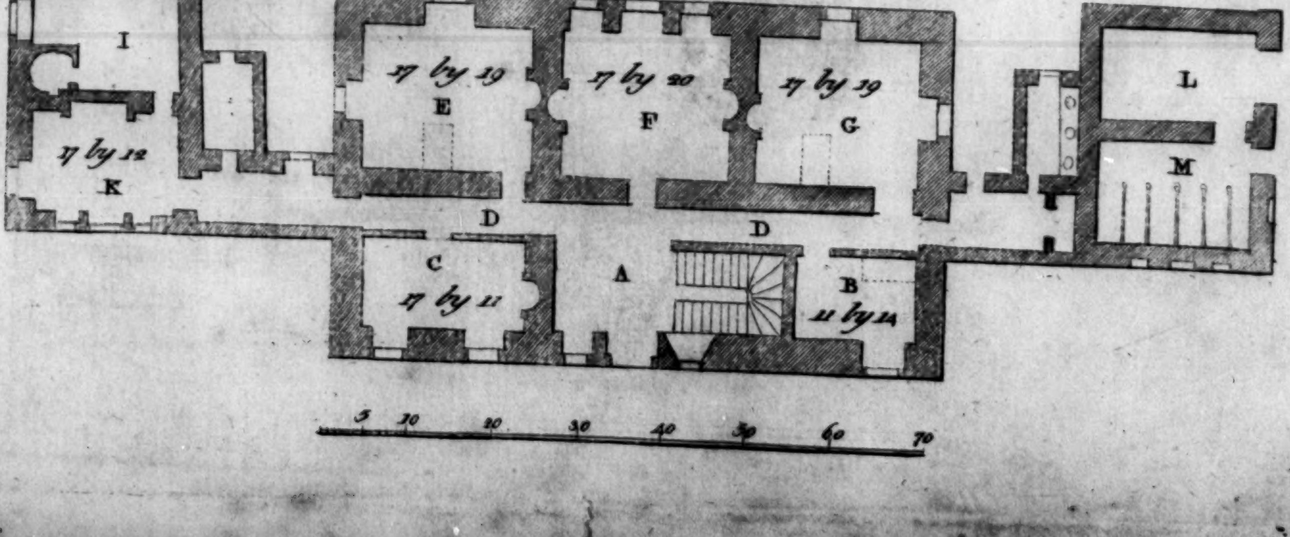

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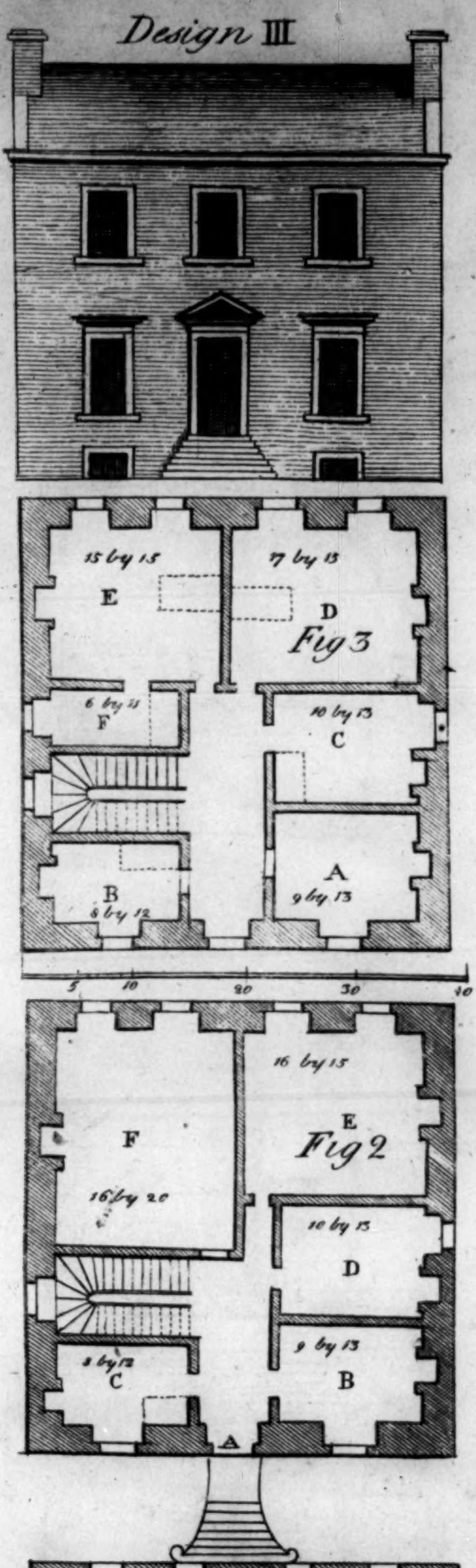
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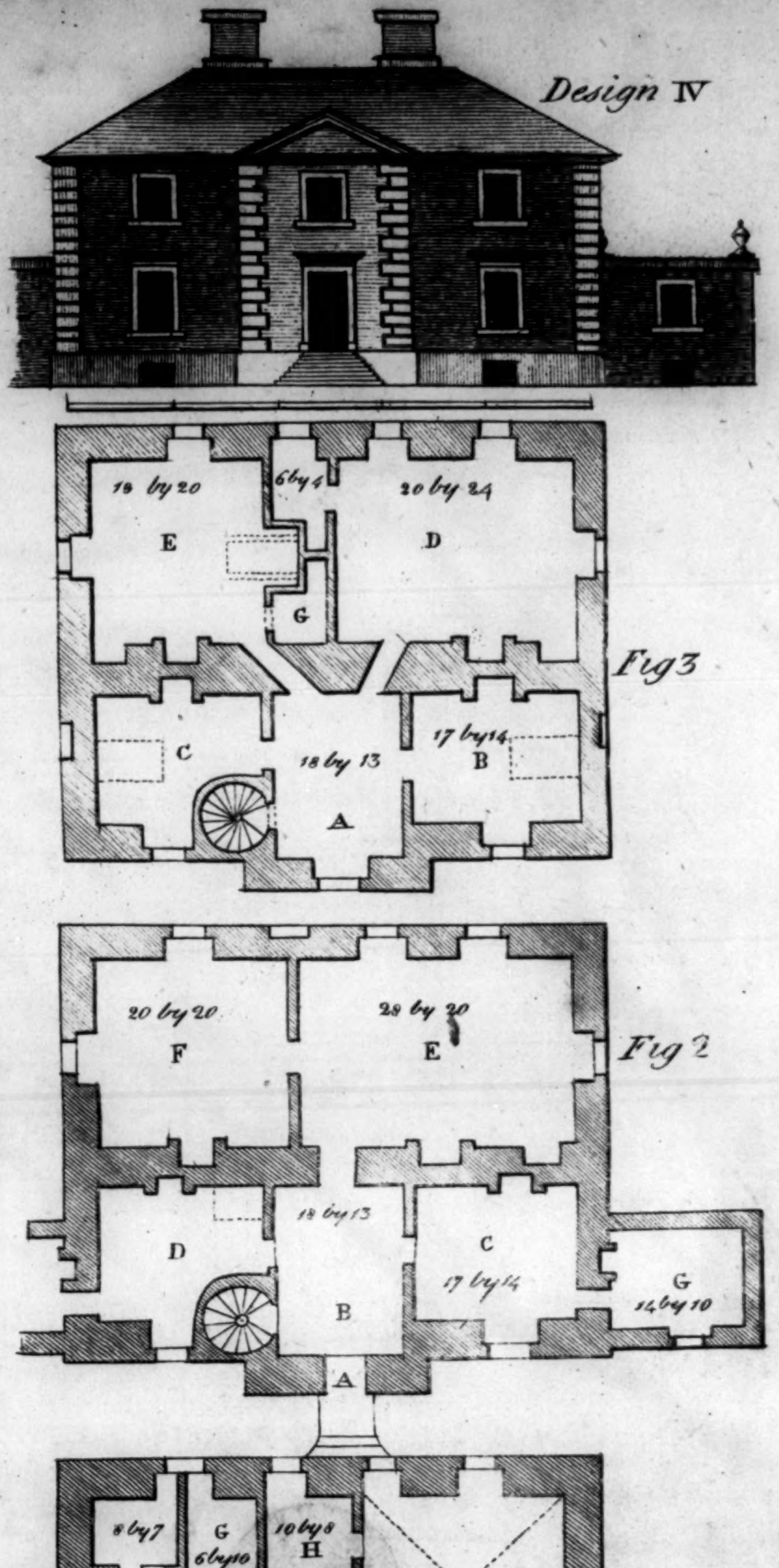
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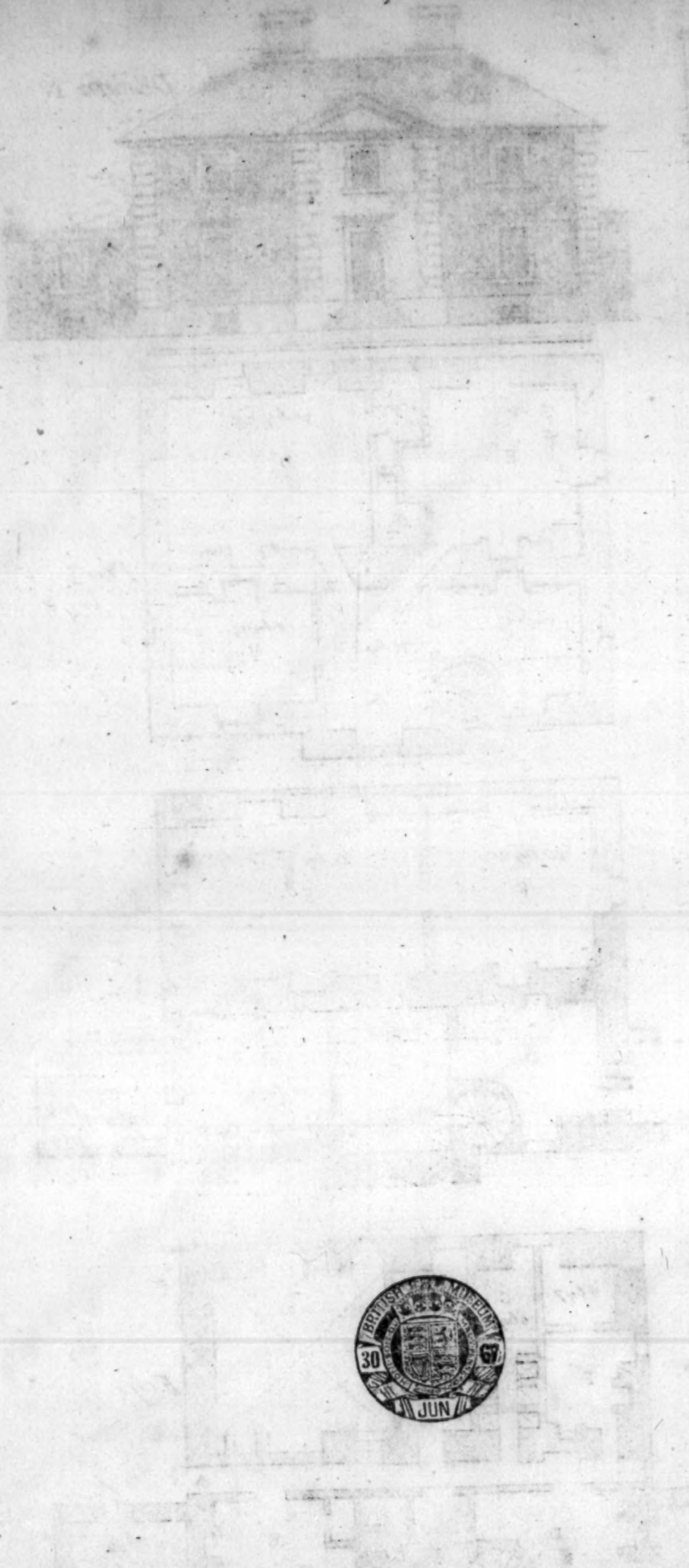

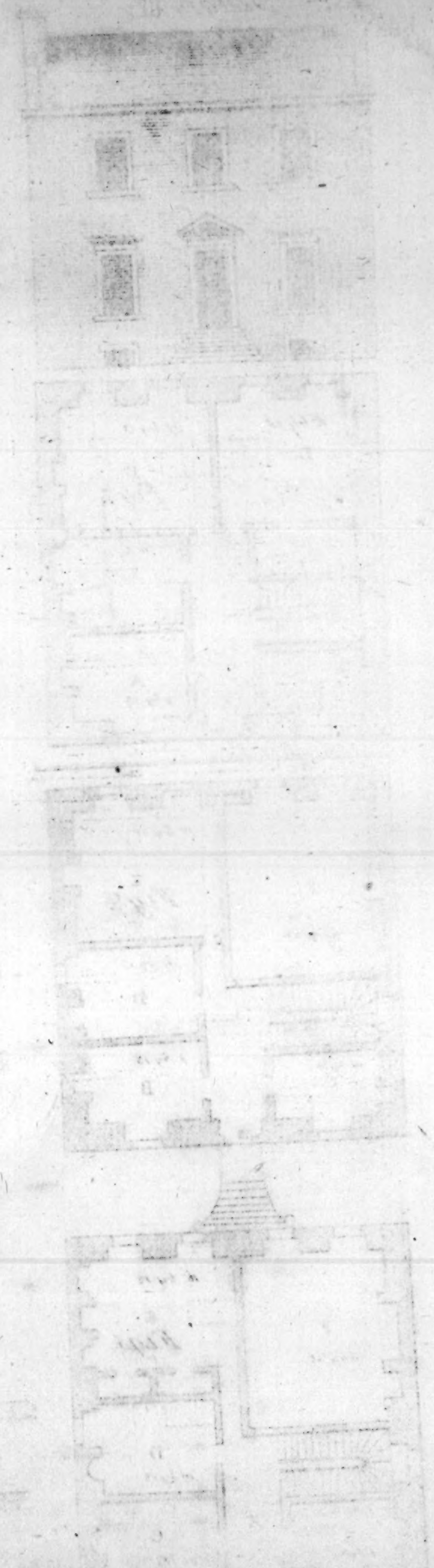

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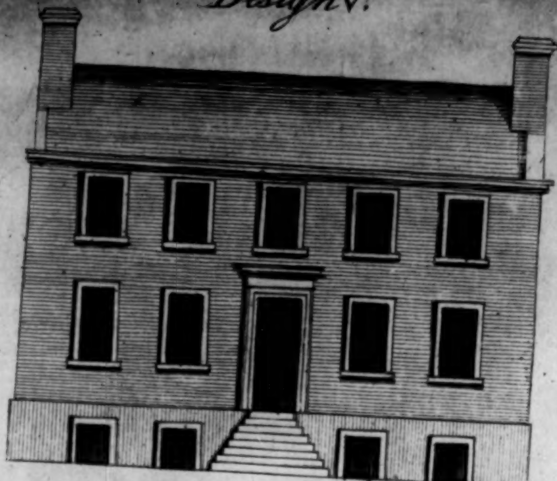

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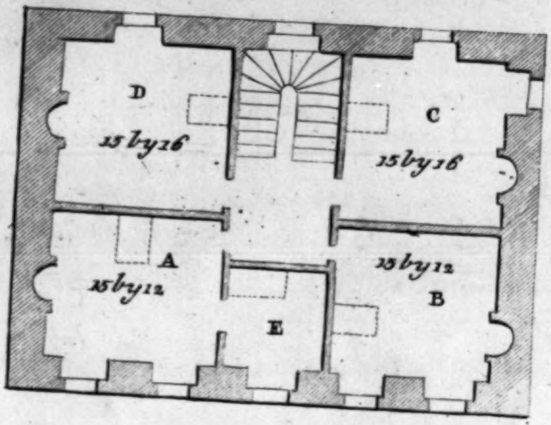

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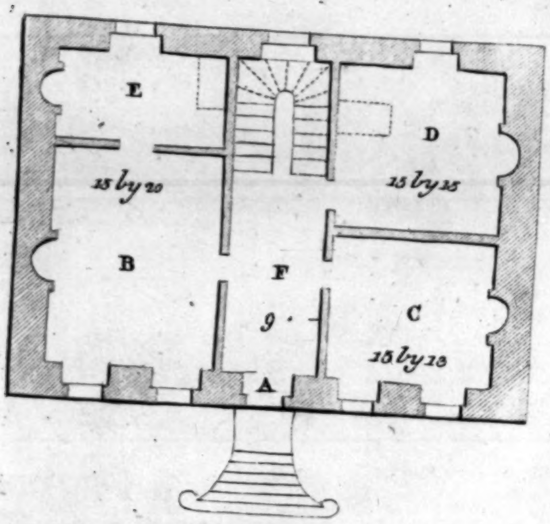

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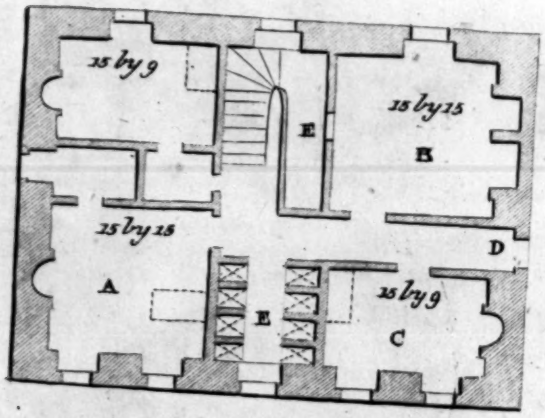

Fig. 1.

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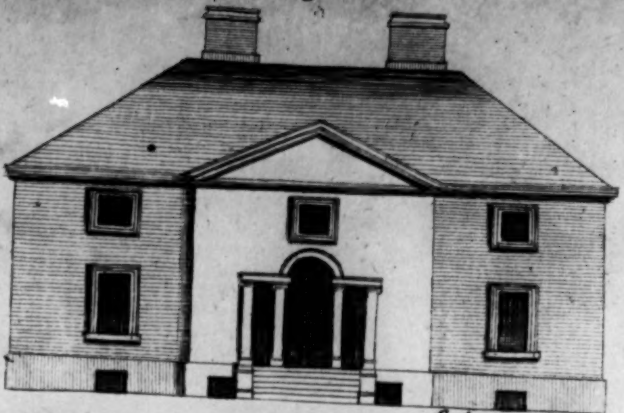

Extends 63 feet

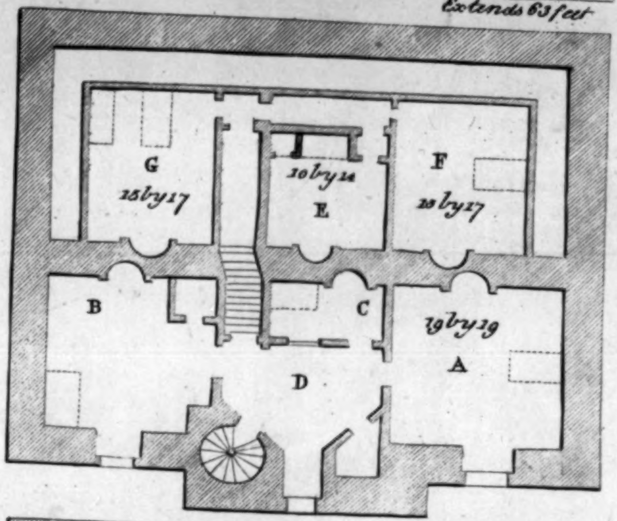

Fig. 3.

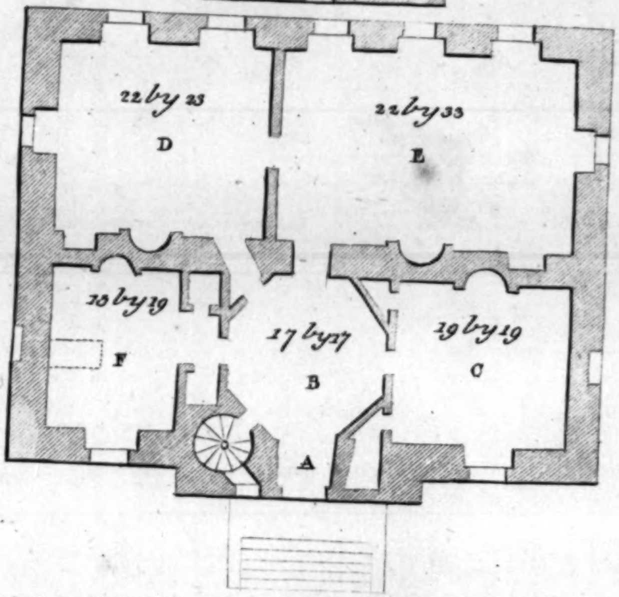

Fig. 2.

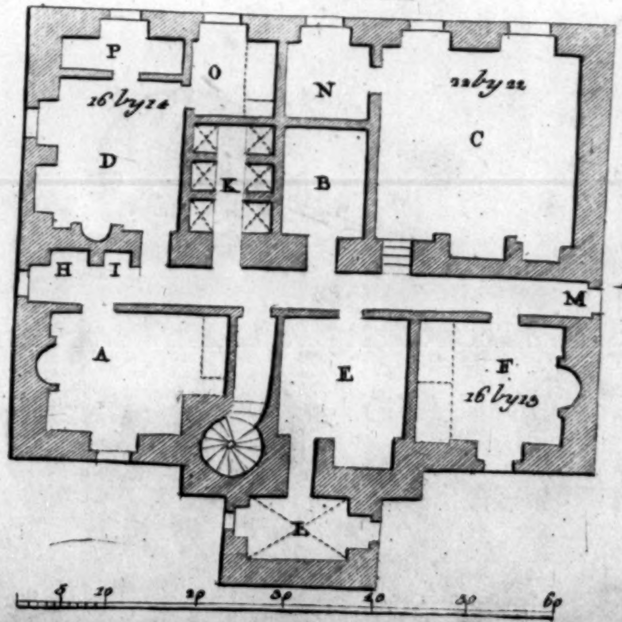

Fig. 1.

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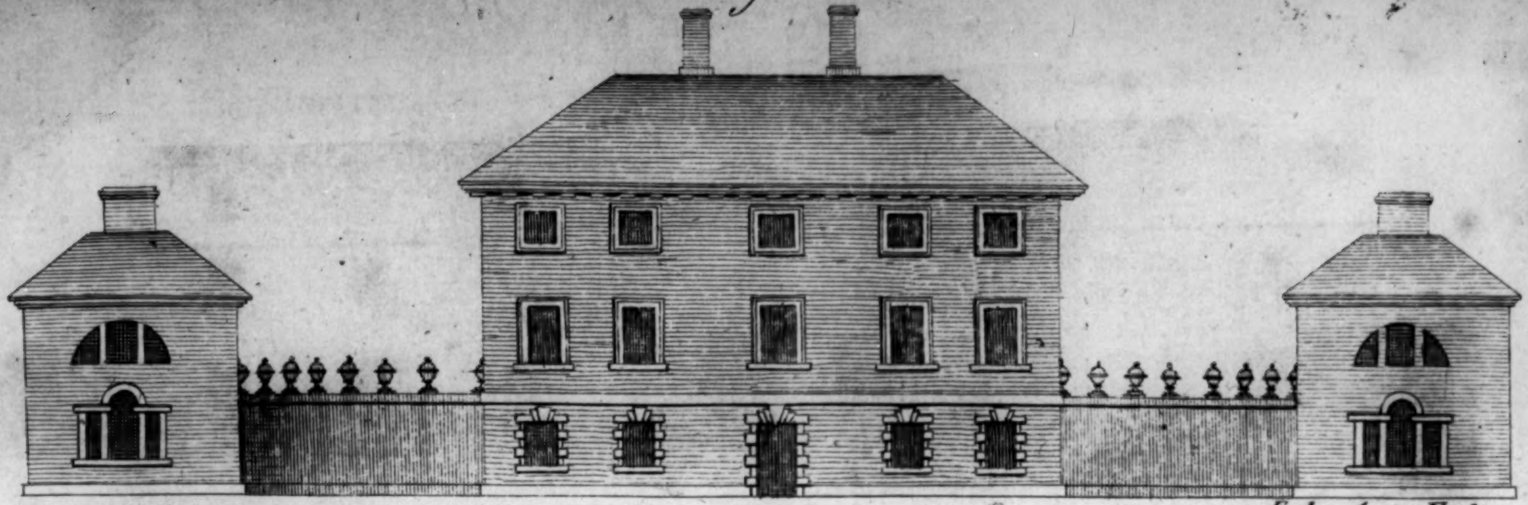
Design VII.



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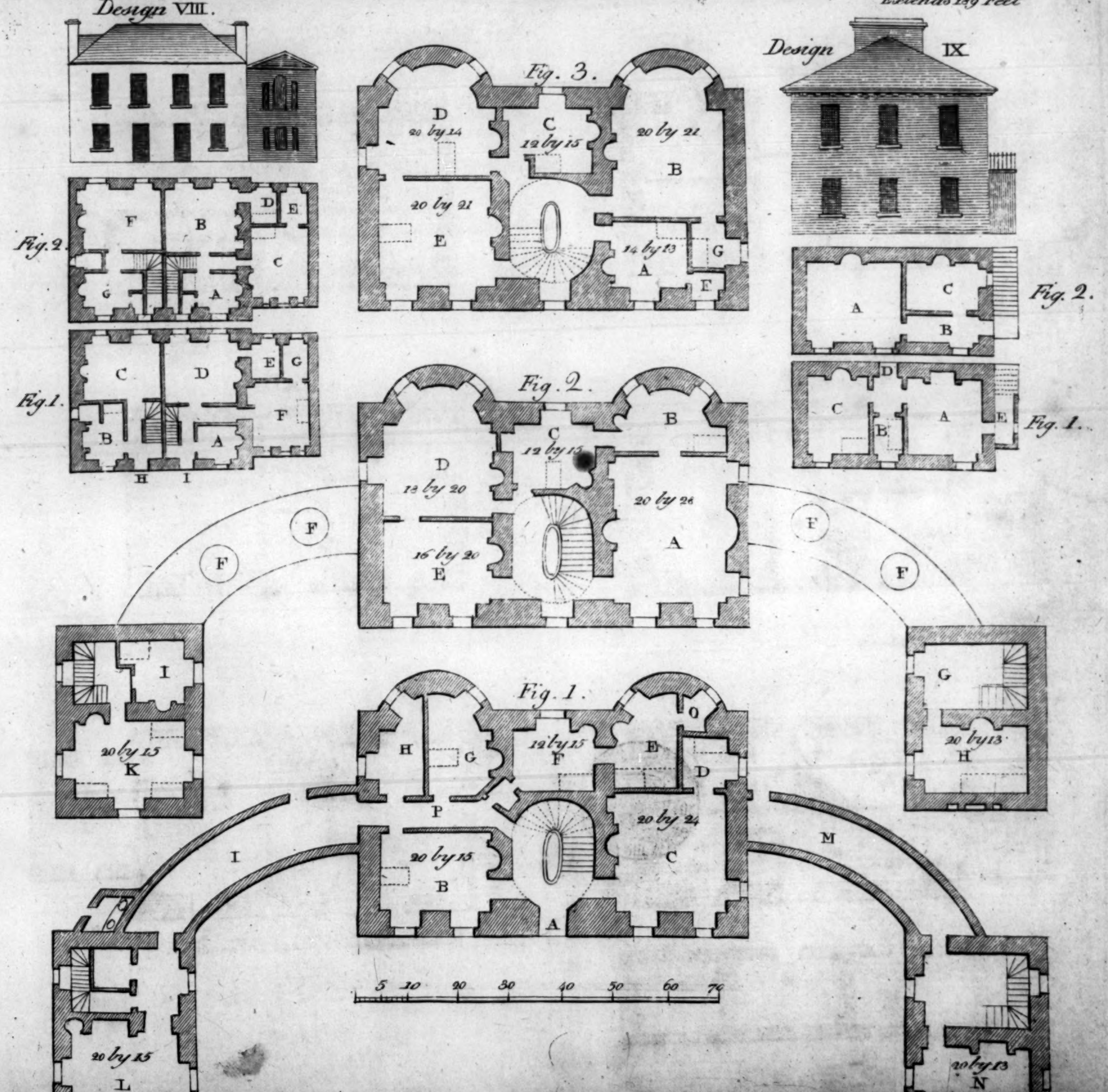

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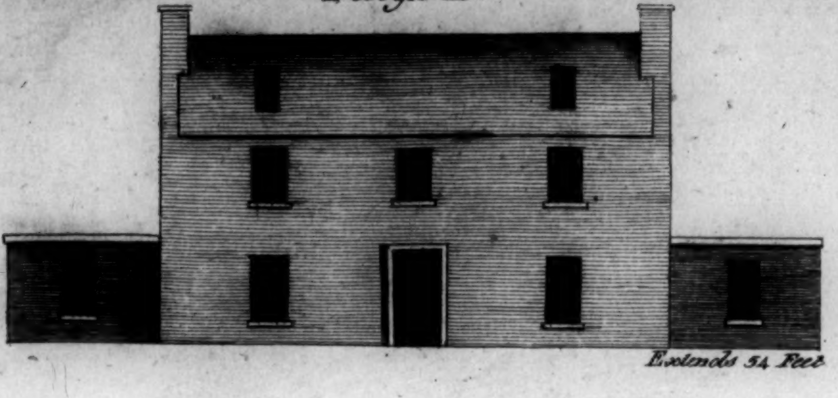

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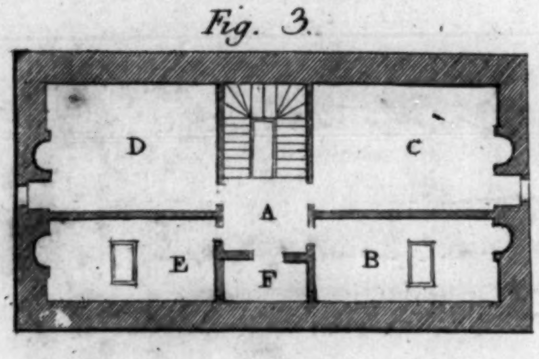
Fig. 3.



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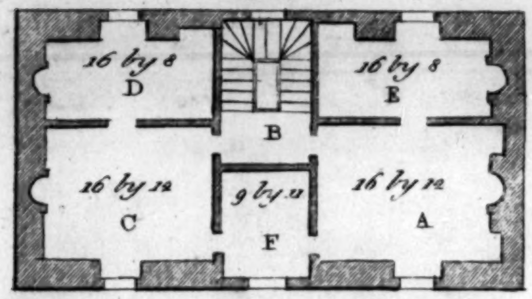

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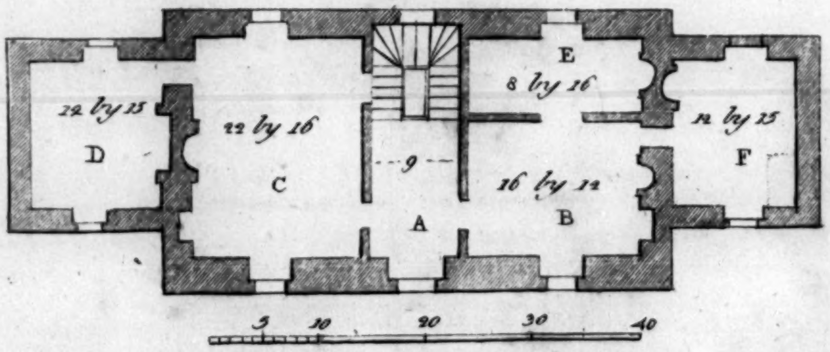

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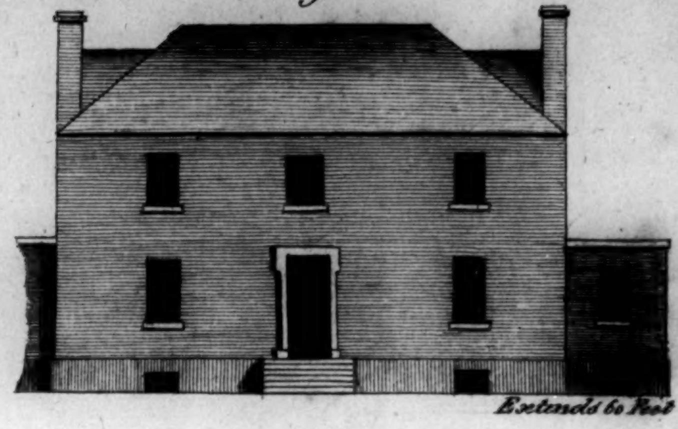

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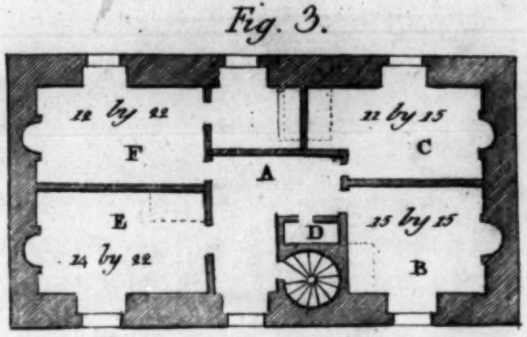

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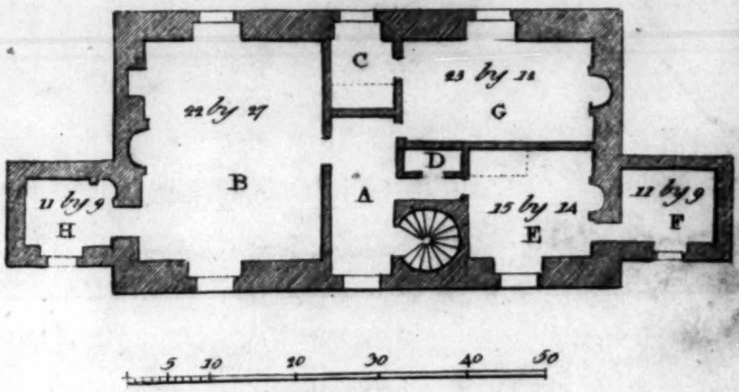

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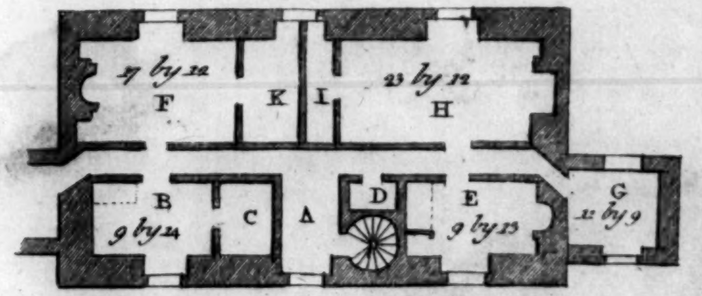

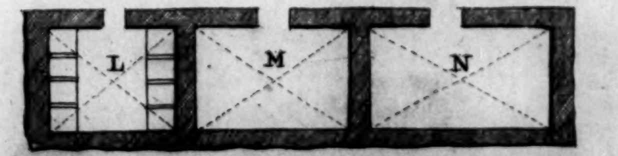

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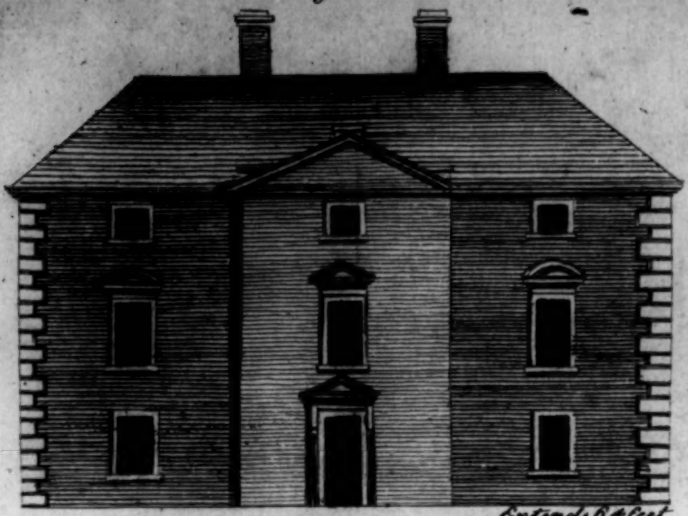

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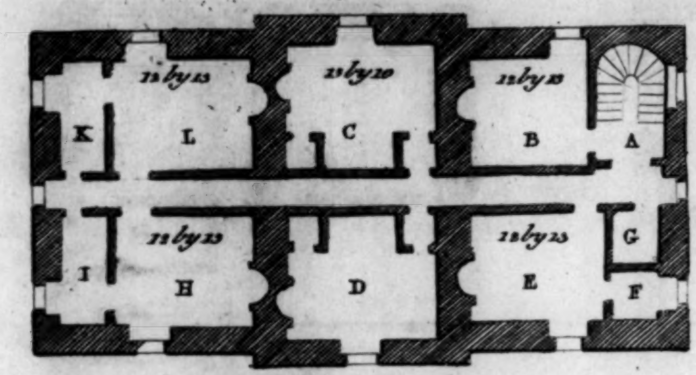

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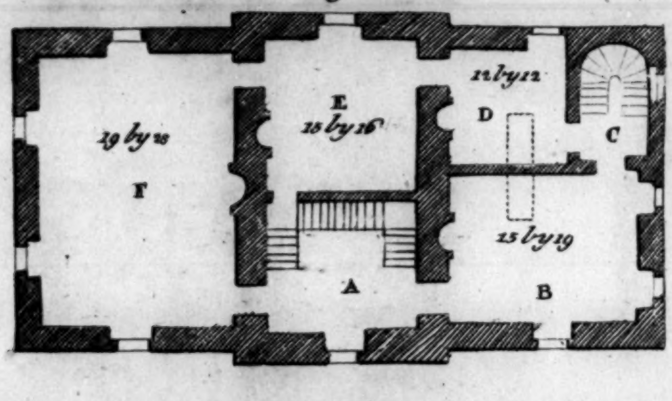

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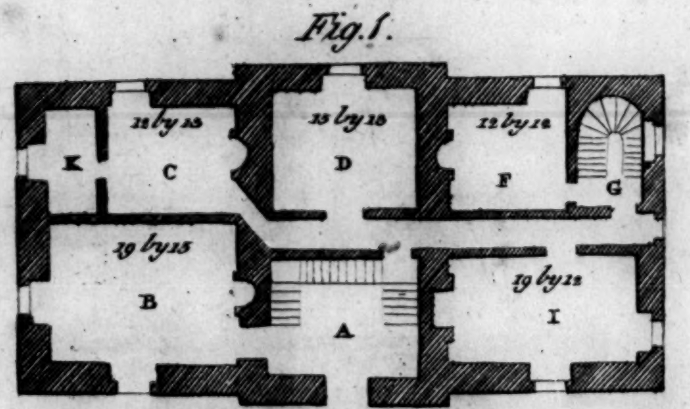

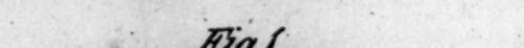

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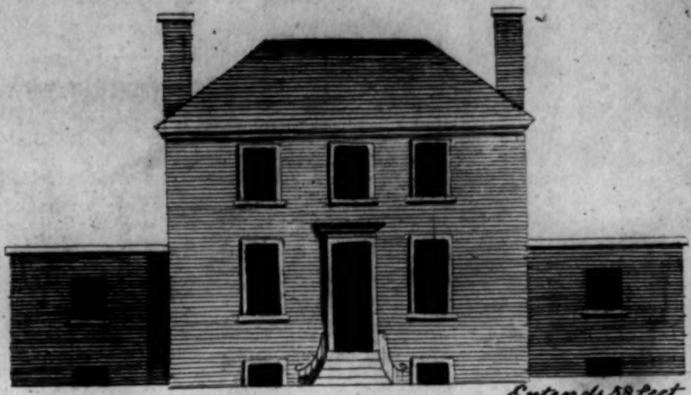

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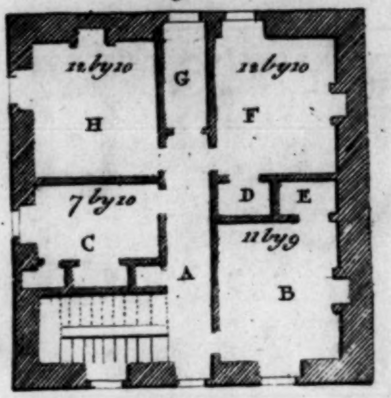

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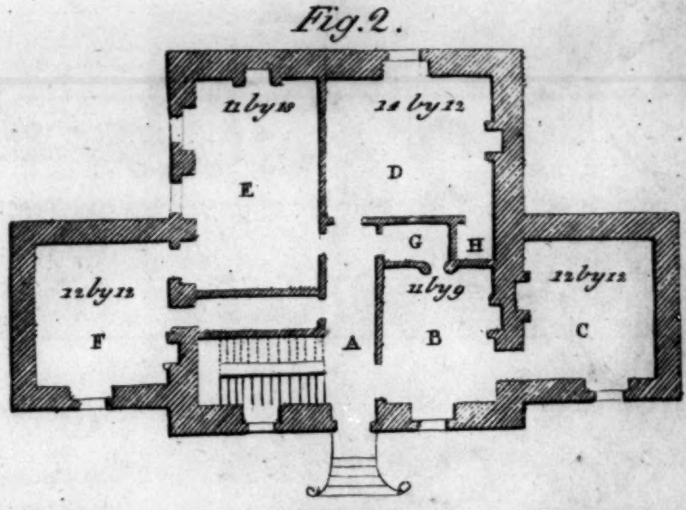

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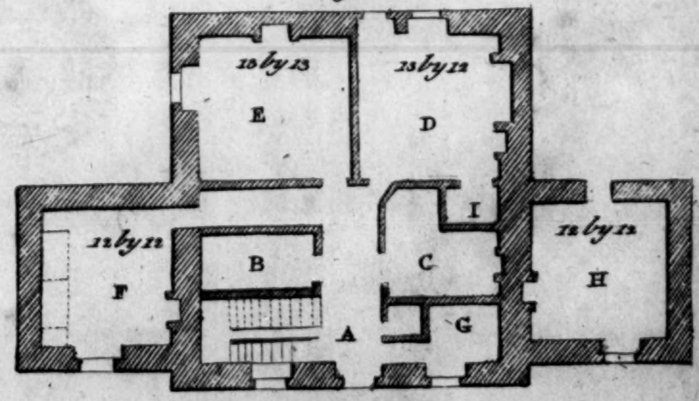

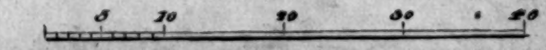

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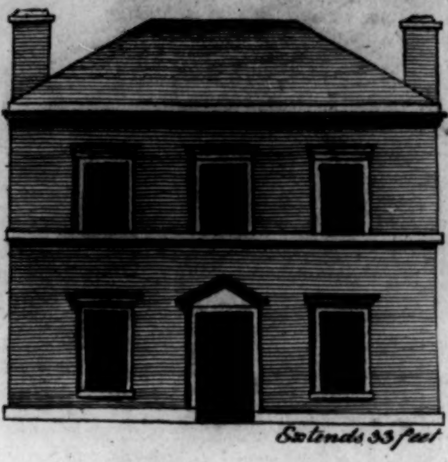

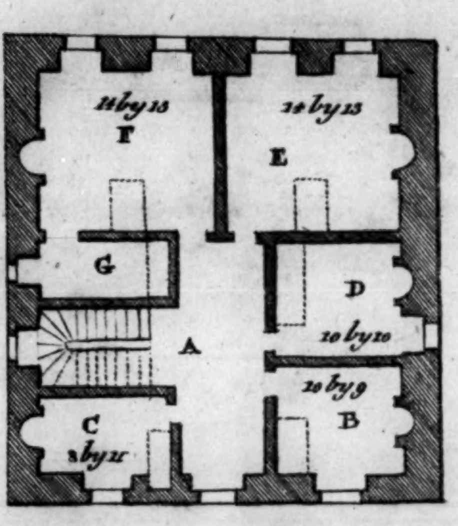

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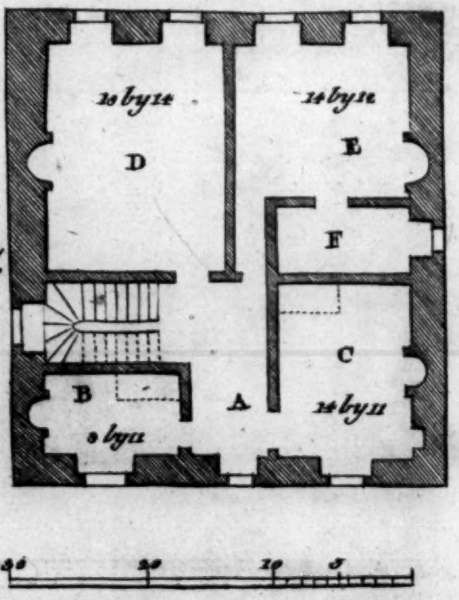

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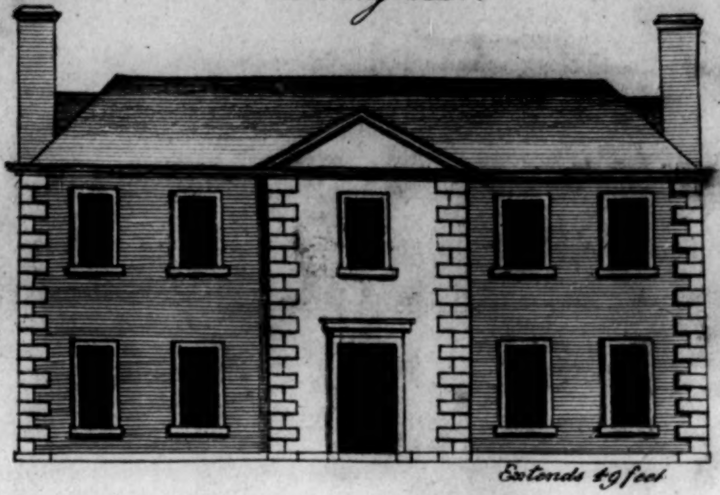

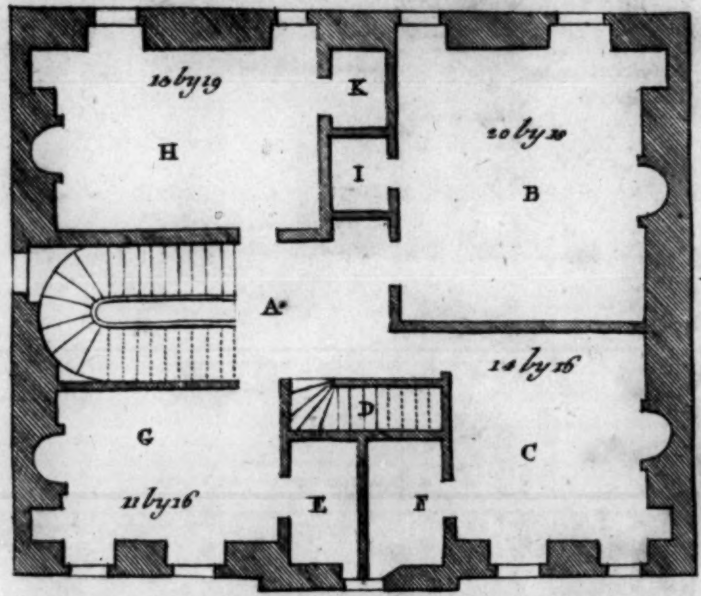

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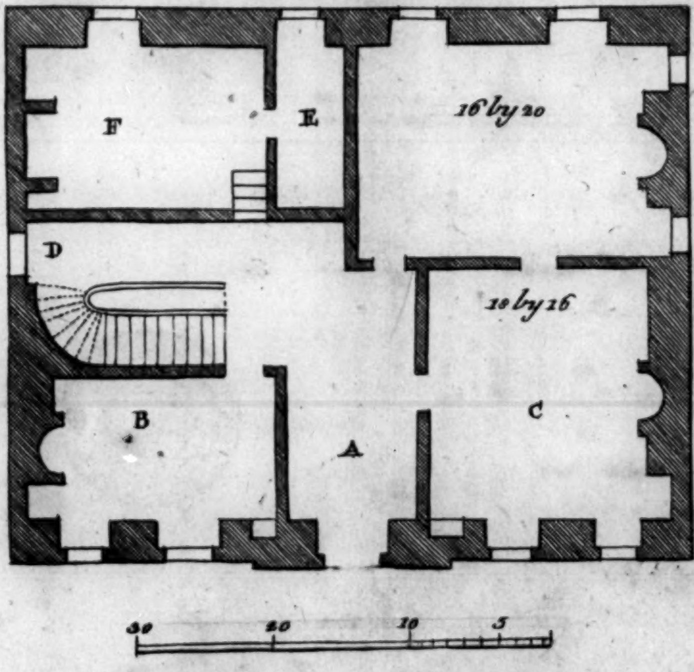

Fig. 1.

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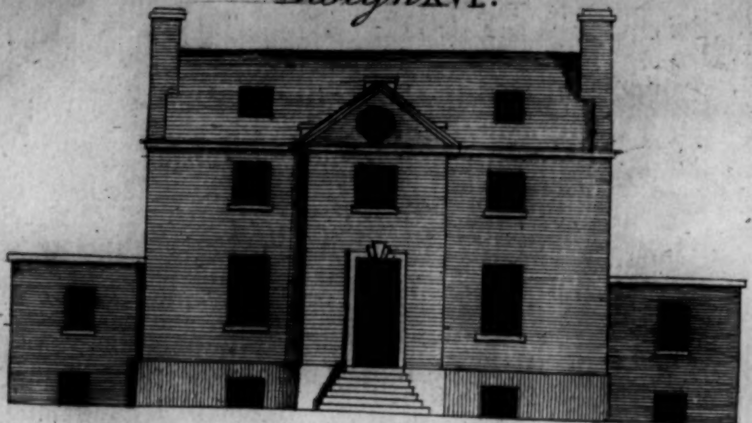
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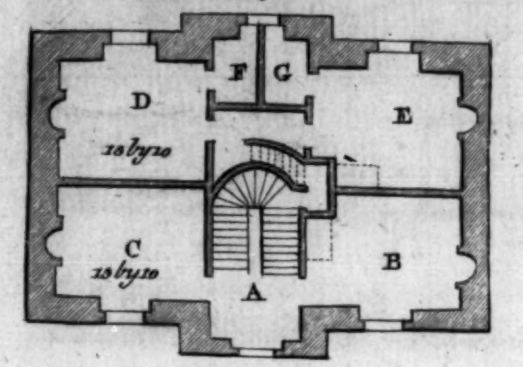

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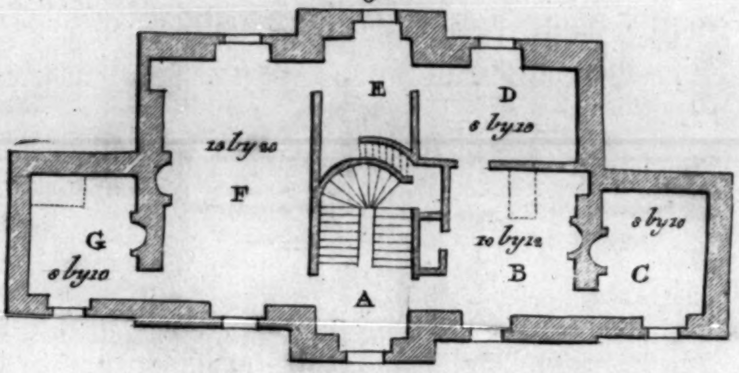

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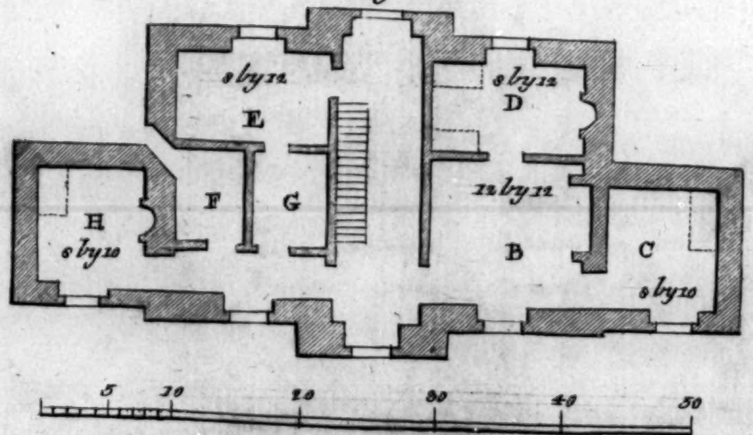

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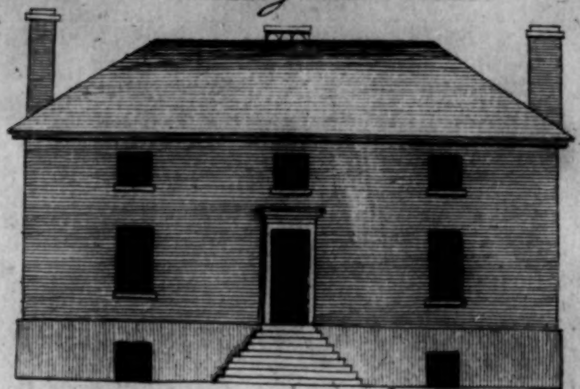
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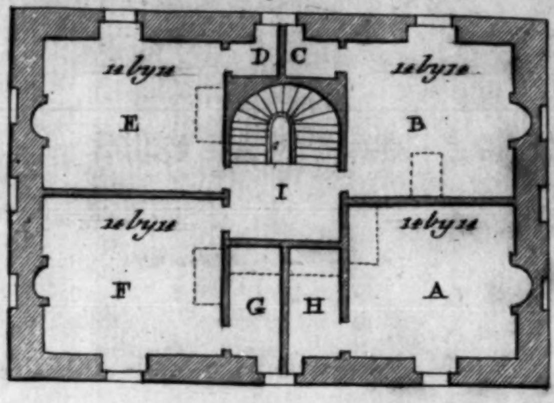

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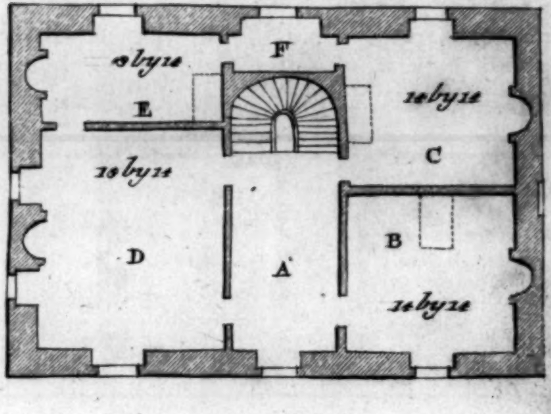

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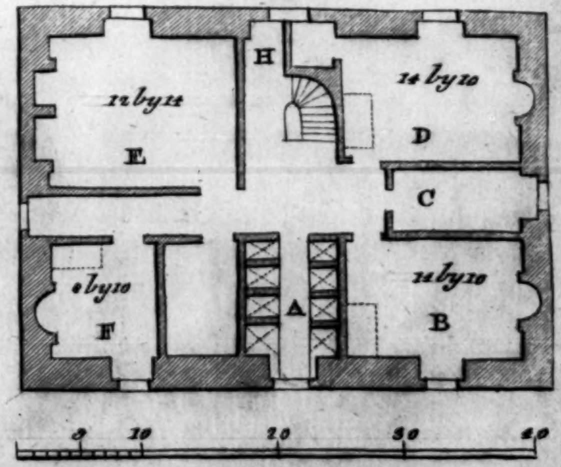

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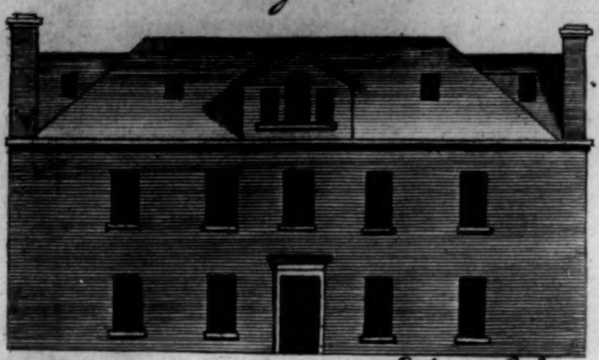

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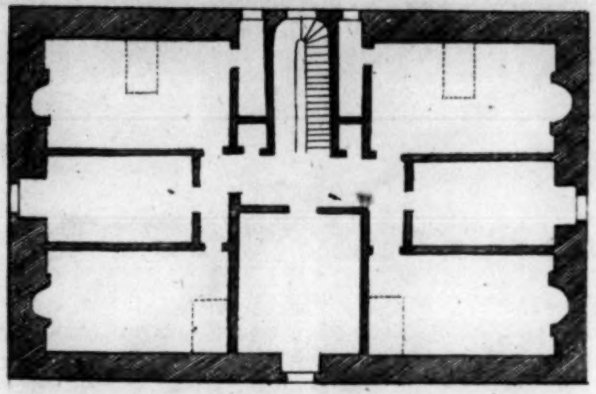

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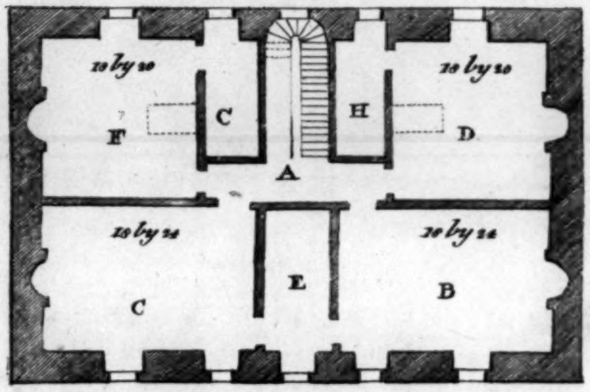

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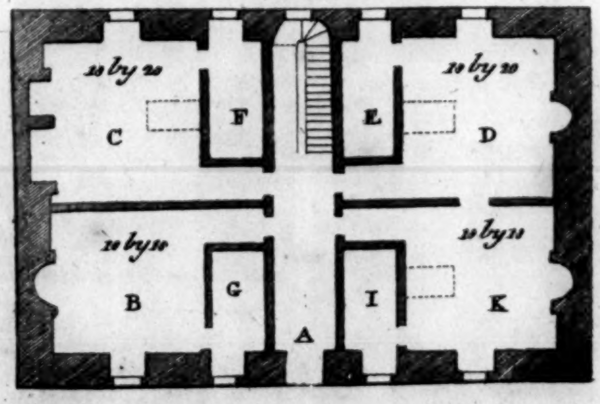

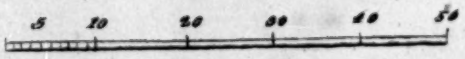

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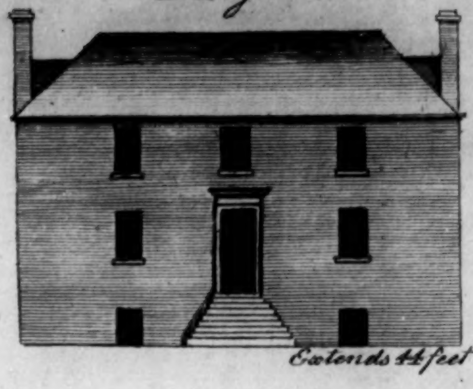

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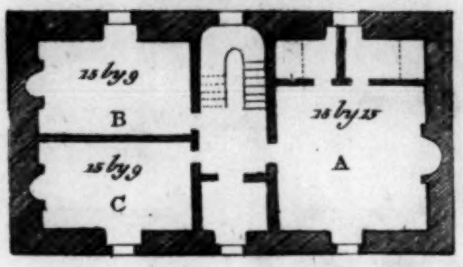
Fig. 3.



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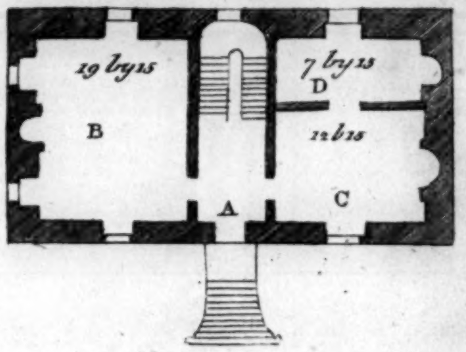

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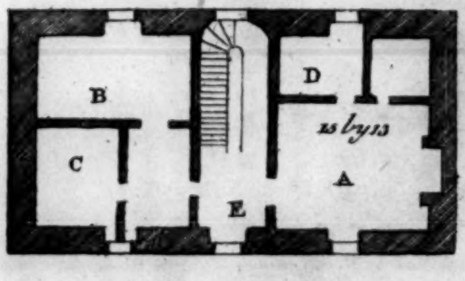

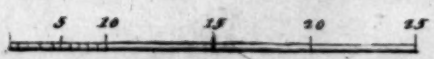

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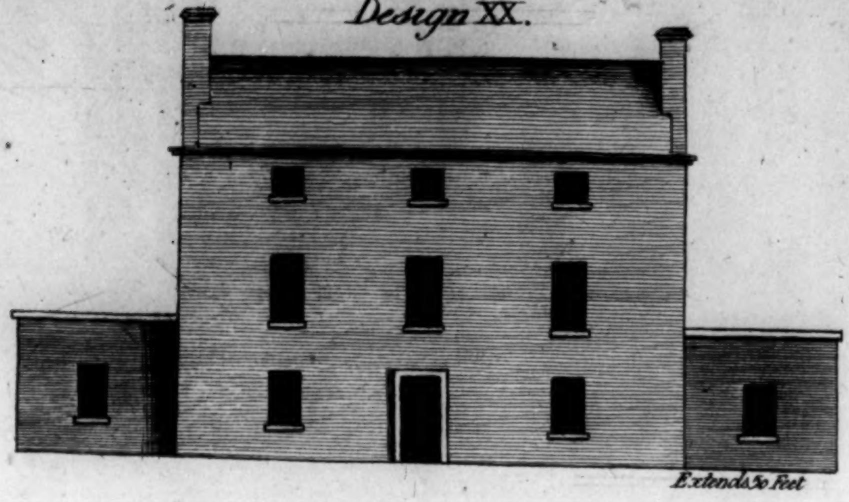
Design XX.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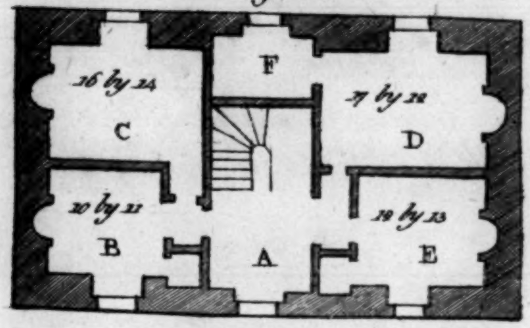

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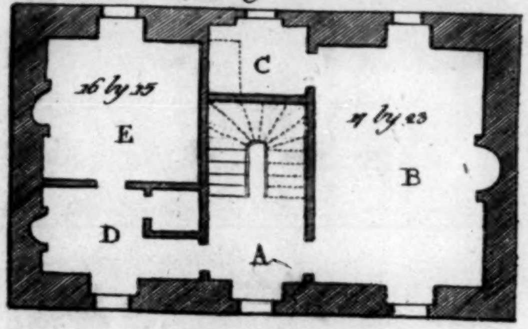

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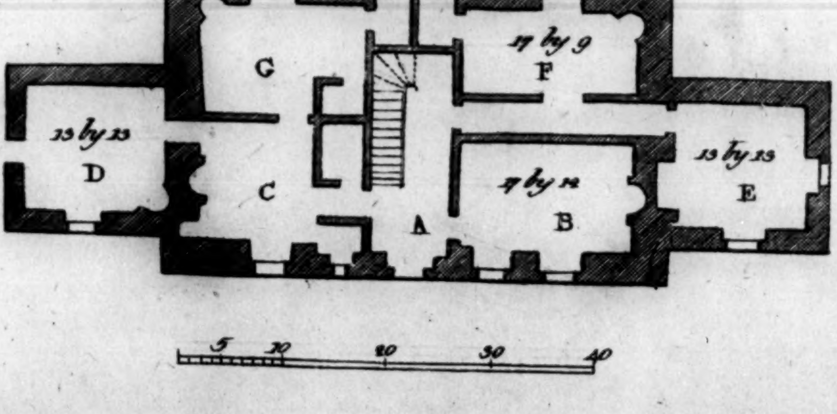

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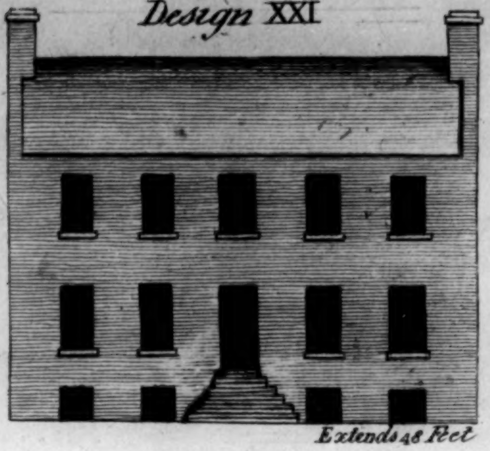
Extends 48 Feet

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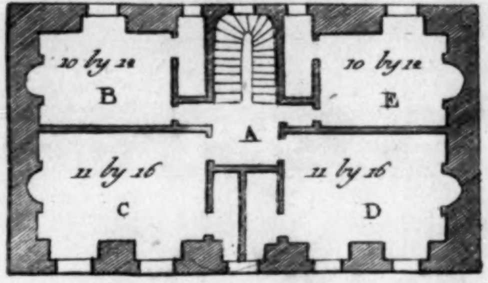
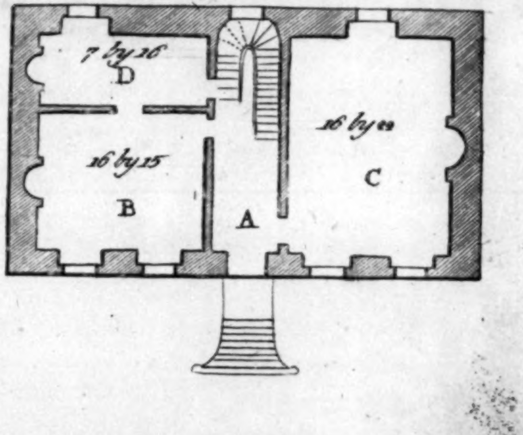


Fig. 2



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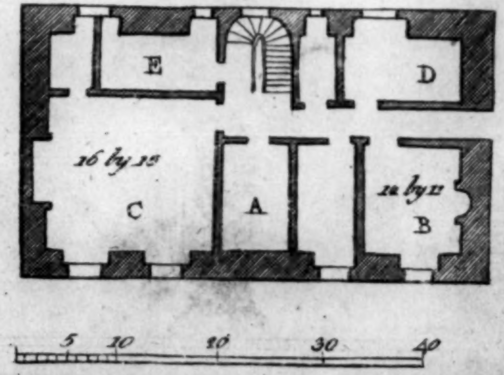

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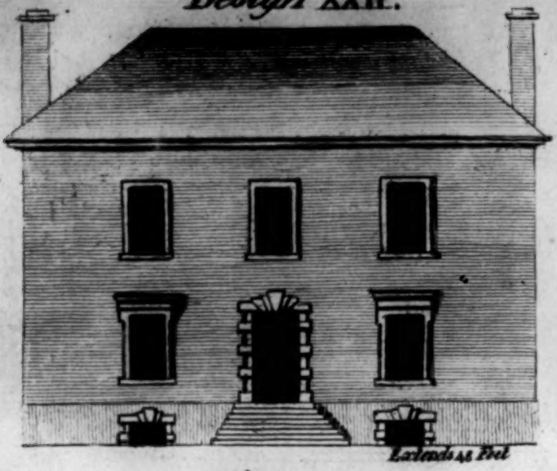

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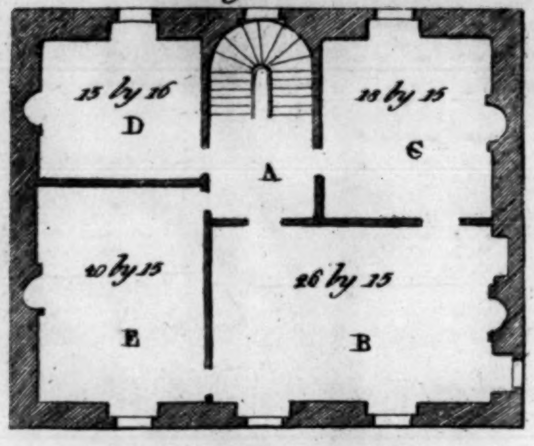

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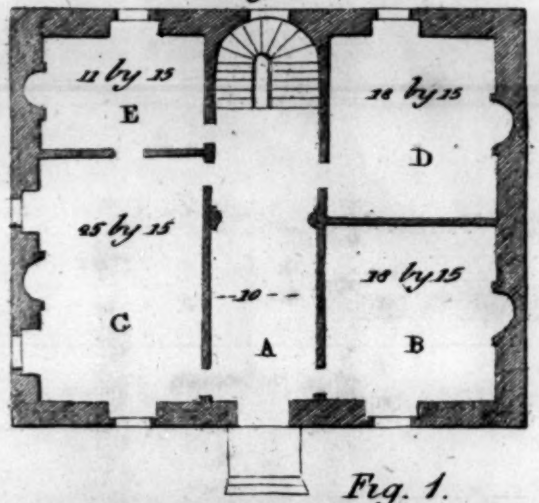

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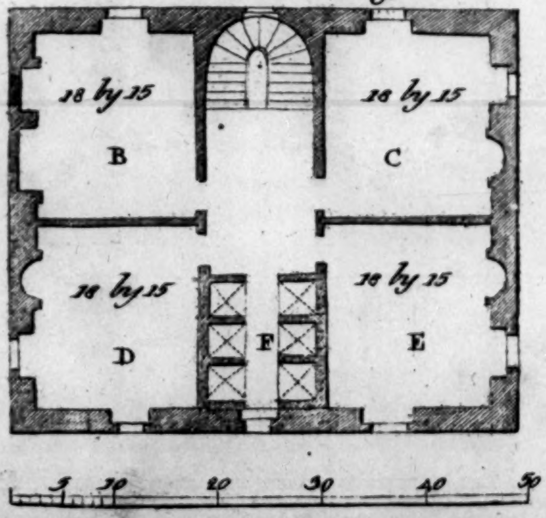

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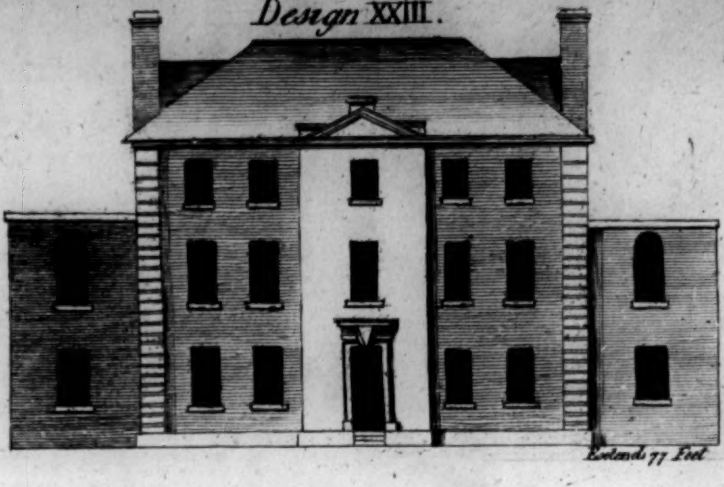

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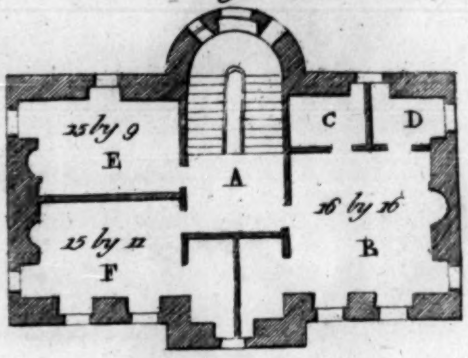

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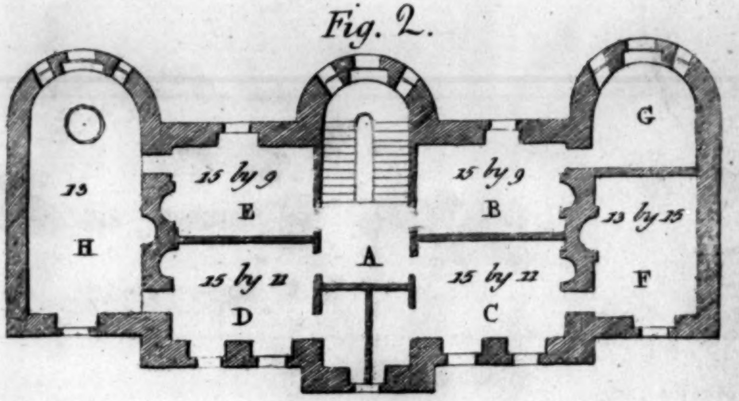

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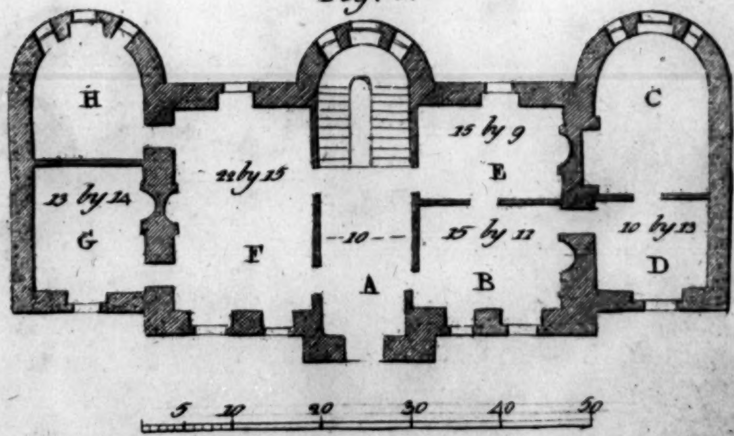

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Design XXIV

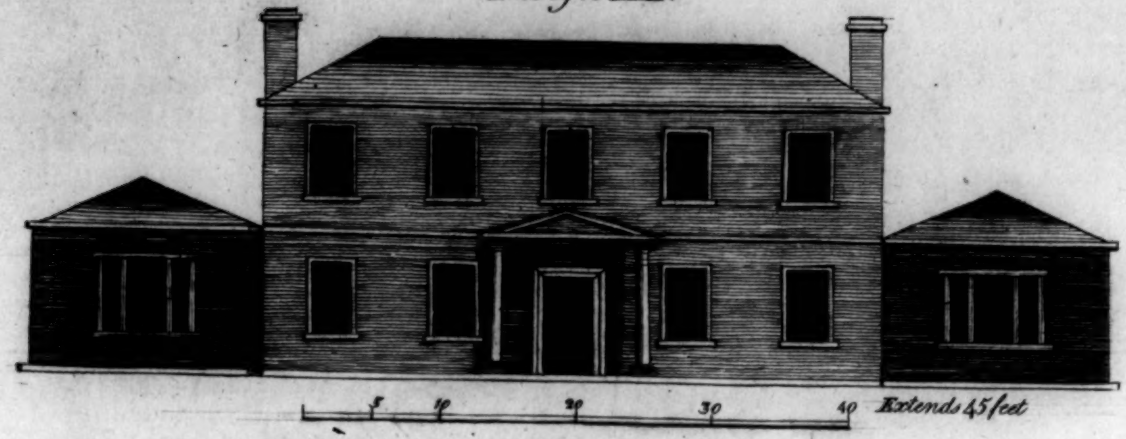


Fig 2

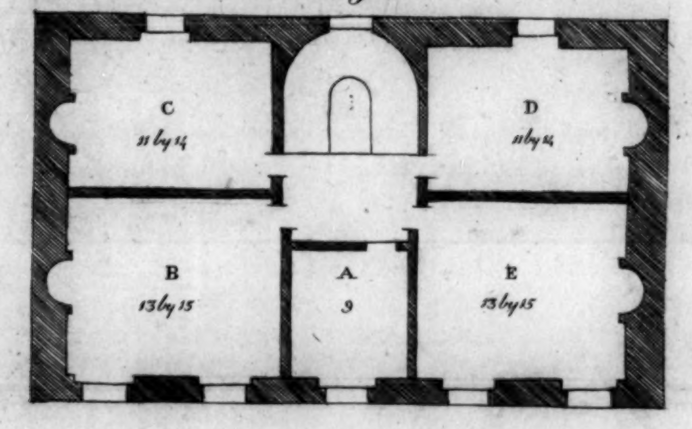
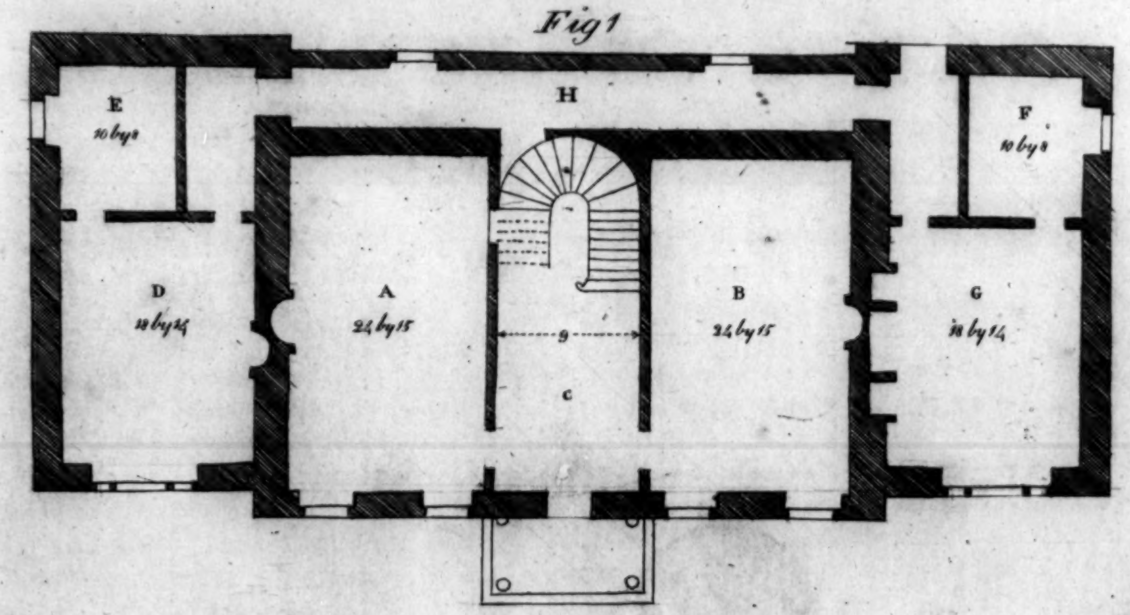


Fig 1



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THE
BUILDER's DICTIONARY:

CONTAINING

An explanation of the Terms made Uſe of in ARCHITECTURE; alſo the Terms of ART uſed by Workmen concerned in Building.

ABACUS is a ſquare table, liſt, or plinth, in the upper part of the chapiters of columns, eſpecially thoſe of the Corinthian Order. *Abacus* comes from the Greek word *abax*.

Abrevoirs, a term in maſonry, by which is underſtood the intervals or ſpaces between the ſtones in laying them, commonly called the *joints*.

Acanthus, the herb whoſe leaves are repreſented in the capital of the Corinthian column.

Acroteria are ſharp and ſpiry battlements or pinnacles, that ſtand in ranges, with rails and baluſters, upon flat buildings. Alſo images ſet on the tops of houſes, are ſo called by ſome.

Acroteres are pedeſtals upon the corners and middle of a pediment to ſupport ſtatues; they may properly be called *pinnacles*. The word in Greek ſignifies the extremity of any thing; the tip of a finger, a rock, or the like.

Acute angle, an angle that contains leſs than ninety degrees.

Adze, an inſtrument uſed by carpenters to chop or cut with.

Alcove, by the Spaniards called *alcobar*, is a receſs within a chamber for the ſetting of a bed out of the way. Alſo a ſeat at the termination of a walk in a garden.

Amphitheatre, is an edifice or building of an oval or circular form, with rows of ſeats one above another, where ſpectators might ſit to behold ſtage-plays, and other public diverſions.

Anabathrum, a place that is aſcended to by ſteps.

Anchors, in architecture, is a certain ſort of carving, ſomewhat reſembling an anchor, or arrow-head; it is commonly part of the enrichments of the boultins of capitals of the Tuſcan, Doric, and Ionic Orders; and alſo of the boultins of bed-mouldings, of the Doric, Ionic, and Corinthian Cornices. Theſe anchors and eggs being alternately carved throughout the whole building.

Ancones, the conſoles, a ſort of brackets and ſhouldering pieces, are called *ancones* by Vitruvius. See *Conſole*.

Annulet, the ſame as cincture, from the Latin *annulus*, a ring; in architecture, it is uſed to ſignify a narrow flat moulding which is common to divers places of the columns, as in the baſes and capitals, &c. It is the ſame member as the Sieur Mauclere, from Vitruvius, calls a *fillet*; and Palladio, a *liſtella*, or *cincture*; and Brown, from Scamozzi, a *ſupercilium*, *liſt*, *tinea*, *eye brow*, *ſquare*, and *rabbit*

Antæ pillars adjoining to the wall. See *Paraſtatæ*

Antichamber, from the Italian *anti camera*, an outer, or fore chamber; a room in noblemen's houſes where ſtrangers ſtay till ſuch time as the party to be ſpoken with is at leiſure

Antic, a term in ſculpture and painting being a confuſed compoſure of figures of different natures and ſexes, &c.; as of men, beaſts, birds, flowers, fiſhes, &c. It is alſo called *groteſque*.

Anticum, from the Latin, a porch before a door, the fore-door, a hatch.

Antipagments, the ornaments or garniſhing in carved work, ſet on the architrave, (jaumbs, poſts, or puncheons of doors,) whether of wood or ſtone.

Antique. Latin. By antique buildings we mean the buildings of the Greeks and Romans.

Angle, (in geometry) is the inclination, or leaning of two lines, one towards the other; the one touching the other, yet not being directly joined together, < as in the figure here repreſented, is called an *acute angle*, if of this form | it is an *obtuſe angle*, if of this form L a right angle.

Apertions, or *aperture*, from the Latin, ſignifying opening; but, in architecture, it is uſed to ſignify doors, windows, ſtair-caſes, chimnies, or other conduits; and in ſhort all inlets or outlets, for men, light, ſmoak, &c.

Aqueduct, from the Latin *aqueductus*, a conveyance made for the carrying of water from one place to another.

Arcade, a range of arches with open places to walk; as that of Covent-Garden, the Royal Exchange, &c.

Arches, it comes from the Latin *arcus*, a bow. In architecture, it is uſed to ſignify an inward ſupport to the ſuperſtructure; and it is either circular, elliptical, or ſtrait.

Architectonic, belonging to the chief overſeer of buildings; alſo to an

Architect, a maſter-workman in a building; and is he that ſuperviſes and gives the draughts or deſigns of a fabric, and directions for a model thereof if required; and alſo whoſe buſineſs it is to conſider of the manner and method of the building, and alſo the charge and expence of the whole.

Architecture, the ſcience which teacheth the art of building, being a ſkill obtained by the art of deſigning, and the precepts of geometry, by which it gives the rules for deſigning and raiſing all ſorts of ſtructures, according to geometry and proportion: Containing under it all thoſe arts that conduce any thing to the framing houſes, temples, &c. The ſcheme, or projection, of a building, is eaſily laid down in three ſeveral draughts or deſigns. The firſt is a plan, which ſhews the extent, diviſion, and diſtribution of the ground into apartments, and other conveniencies. The ſecond ſhews the ſtories, their heights and outward appearances of the whole building; and this we call the *deſign*, or elevation. The third, called the *ſection*, ſhews the inſide; and from theſe three deſigns the undertaker forms a computation of the expence of the building, and the time required to go through with it: So much for what is called *civil architecture*. Military architecture, uſually called *fortification*, has for its object, the making a place of difficult and dangerous approach to an enemy.

Archives, a place where ancient records, charters, and evidences of a nation, are kept: Alſo, the records themſelves.

Architrave. The word comes from the Greek *archos*, chief; and the Latin *trabs*, a beam. It is alſo ſometimes called *epiſtyle*, from the Greek *epi*, upon, and *ſtylos*, a column. It is uſed in architecture to ſignify the moulding or ornament next above the capital of a column; it being always the next member below a freeze: The word is alſo ſometimes uſed to ſignify the chief or principal beam of a building, as what we call *porticos*, *piazzas*, or *cloyſters*. By cloyſters we underſtand a long kind of galleries, or walking-places, whoſe roof is borne, or ſupported, by columns or pillars, at leaſt on one ſide, and have not arches riſing from them to bear the ſuperincumbent part of the fabric, but have a beam reſting or lying upon the tops of the columns, by which the ſuperior part of the edifice is ſupported; upon which account I ſuppoſe it to be called *chief* or *principal beam*. In chimnies, the architrave is the mantle over the jaumbs of doors; it is called *hyperthyron*.

There are alſo architrave doors and windows; thoſe are called *architrave doors* which have an architrave on the jaumbs or puncheons, and over the doors upon the cap-piece, if ſtrait. Alſo upon the jaumbs and cap-pieces of windows. The form of theſe architraves about doors are not always the ſame; for ſometimes they are according to one of the five Orders of Architecture; but it is ſometimes done according to the workman's fancy.

Aræoſtyle, this word Vitruvius uſes to ſignify the greateſt interval or diſtance which can be made between the columns, conſiſting of four diameters. It comes from the Greek *araios*, thin ſet; or, *rare* and *ſtylos*, a column.

Aſhlar; by *aſhlar* is meant common or free ſtones, as they come out of the quarry, of different lengths and thickneſſes.

Aſhlering, quartering in garrets about 2½, or 3 foot high, perpendicular to the floor, up to the under ſide of the rafters.

Aſtragal, a little round moulding, which encompaſſes the top of the ſuſt, or ſhaft, of a column. It comes from the Greek *aſtragalos*, the bone of the heel. The ſhaft always terminates at top with an aſtragal, and at bottom with a fillet, which in this place is called *ozia*.

Attic, in building, a little order, placed upon another much greater; for, inſtead of pillars, this order has nothing but pilaſters, with a cornice architraved for an entablement; as that, for inſtance, in the caſtle of Verſailles, above the Ionic, on the ſide of the garden.

Attic, or *Athenian* baſe, the ſame as the Doric baſe; which ſee.

B

BACK, *baquette*, a kind of aſtragal, or hip moulding, is a term in carpentry, by which they ſignify the outward angle, or the hips, or corners of a roof; which, in ſquare frames, where the roof is ¾ pitch, contains an angle of 116 degrees 12 m.

It is alſo a term uſed by iron-mongers, to ſignify a certain ſort of nails.

Balcony, is a kind of open gallery, without the walls of a houſe or building, for people to ſtand in, and behold any action, as pageants, and the like, in cities, or to take the air, &c.

Balduquin, is a French word, which pro-

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perly ſignifies a canopy carried over the holy ſacrament, among the Roman catholics. 'Tis uſed by architects to ſignify a piece of architecture, built in faſhion of a canopy, or crown, ſupported by ſeveral pillars to ſerve for a covering to an altar; ſome alſo uſe it to ſignify a ſhell over the front-door of a houſe.

Balks, pieces of fir-timber coming from beyond the ſeas by floats.

Ballon, French, a term in architecture, ſignifying the round globe of the top of a pier, or pillar.

Baluſtrade, a term in architecture, uſed to ſignify a row of turned pillars, called baluſters, made of marble, iron, wood or ſtone, ſo high as for a man to reſt his elbows, fixed upon a terraſs, or upon the top of a building, or to make any ſeparation.

Band, in architecture, is any flat member that is broad, and not very deep; the word *face* is ſometimes uſed to ſignify the ſame thing.

Bandelets, it is derived from the French *Bandelette*, a little fillet, or band; it is uſed by architects, to ſignifiy the three parts that compoſe an architrave.

Bargecourſe, is a term uſed by workmen, by which they ſignify a part of the tyling, which projects over without the principal rafters, in all buildings where there is a gable-end.

Baſe, from the Greek, *baſis*, a reſt or ſupport to any body, and which bears up another; but is particularly applied to the bottoms of columns and pedeſtals.

Baſilic, this among the ancients, was a large hall, with portico's, iſles, tribunes and tribunals, when the kings themſelves adminiſter juſtice. *Baſiliſcos*, in Greek, ſignifies *royal*.

Batter, a term uſed by workmen, to ſignify that a wall, a piece of timber, or the like, doth not ſtand upright, but leans from youward, when you ſtand before it; but when it leans toward you, they ſay it over-hangs, or hangs over.

Bay, the word is uſed to ſignify (as it were) the magnitude of a barn; for if a barn conſiſts of a floor and two beams, where they lay corn, they ſay a barn of three bays.

Bay-window, is ſuch a one as is compoſed of an arch of a circle; and ſo by conſequence will ſtand without the ſtreſs of the building.

Bead, a moulding ſo called, which is commonly made upon the edge of a piece, and known by all workmen.

Beam, in building, is a piece of timber which always lies croſs the building, into which the feet of the principal rafters are framed.

Beam-filling, is bricklayers-work, it is only filling up the vacant ſpaces betwixt the raiſing-plate and the joiſts.

Bedding-moulding, is a term uſed commonly amongſt workmen, it conſiſts of theſe four members, *viz.* 1. (below) an O. G. 2. A liſt. 3. A large boultin; and 4th and laſtly, under the coronet another liſt; this is what they frequently call a bed-moulding.

Bevil, any thing that is not ſquare is called a bevil angle; whether it be more obtuſe, or more acute than a right angle.

Binding Joiſts, are thoſe joiſts, in any floor, into which the trimmers of ſtair-caſes (or well-hole for the ſtairs) and chimney-ways are framed; theſe joiſts ought to be larger than common joiſts.

Boaſt, among workmen, is the taking off the ſuperfluous part in carving, or mouldings, *&c.*

Borders, among workmen, are thoſe pieces round the ſlabbs of chimneys in the floor. Alſo all plain ſpaces round *carving*, *painting*, &c. is called the *border*.

Bond, a term uſed among workmen; for when they ſay, *make good bond*, they mean, faſten the two or more pieces of timber well together, either with tenanting and mortiſing, or dove-tailing, *&c.*

Botham, is an ironmonger's term, by which they uſe to ſignify a certain ſort of nails.

Boulder-walls, that is, walls made of round flints, or pebbles, which are found where the ſea hath a breach caſt up, and alſo at ſome other places where there are plenty of flints.

Boultin, in architecture, is a convex-moulding, that conſiſts of an exact ¼ of a circle; being the member next below the plinth in the Tuſcan and Doric capitals.

Brace, in a building, is a piece of timber, which is framed in with bevel-joints. Its uſe is to keep the building from ſwerving, either this or that way; they are ſometimes called ſtruts, *viz.* when they are framed in the king-piece, and rafters.

Bracketts, or *Braggotts*, are the ſeeming ſupports of the ends of ſteps to ſtairs, alſo to ſhelves, *&c.*

Breſt, a term in architecture, made uſe of by ſome, to ſignify the ſame member in a column, that others call a *thorus*.

Breſt-ſummers, in a building, are timbers into which the girders are framed in the firſt floor; but when in the ground-floor (they call it a ſill) and in a garret-floor, then it is called a beam.

Butment, is a term uſed by maſons and bricklayers, by which they mean the ſupporters, or ſtays, on, or againſt, which the feet of arches reſt.

Button-nails, are a ſort of nails with round heads, and but ſhort ſhanks, tinned and lackered.

Buttreſs, a term in architecture, uſed to ſignify a ſtrength, or ſupport, either of brick, or ſtone, intended to keep the work the firmer in its poſition, as againſt brick, or ſtone-walls, that are high, or have any conſiderable weight againſt them on the other ſide, as a bank of earth, or the like; they are alſo uſed againſt the angles of ſteeples, churches, and other buildings of ſtone, *&c.*

C

CABINETS, ſtrictly taken, is the moſt retired place in a houſe.

But a cabinet in palaces, and great houſes, conſiſts of an out-chamber, and a cabinet with gallery on the ſide.

Caliducts, that is, conveyers of heat. The ancients uſed to warm their rooms with certain (ſecret) pipes (called *caliducts*) that were conveyed in the walls, tranſporting heat to ſundry parts of the houſe, from one common-furnace.

Camber-beams, a piece of timber cut arching (or with an obtuſe angle) in the middle. Camber-beams are commonly uſed in platforms, as church-leads, *&c.*

Cames, the ſmall ſlender rods of caſt-lead, of which the glaziers make their turned lead.

Camerated, vaulted or arched.

Cantalivers, the ſame as modillions, only thoſe are plain, but theſe are carved. They are both a kind of cartouzes, ſet (at equal diſtance) under the corona of the cornice of a building.

Cantaliver-cornice, is ſuch a cornice as have cantalivers under it.

Capital, is the upper part of a column; ſuch as have no ornaments, are the Tuſcan or Doric, we call capitals with mouldings; and the reſt which have leaves, and other ornaments, capitals, with ſculptures. The word is deriv- from the Latin, *caput*, the head or top of any thing.

Carcaſe, the timber-work (as it were the ſkeleton) of a houſe, before it is lathed and plaiſtered.

Cariatides, from the Greek, *Kariatydes*, a people of Caria: By theſe in architecture, are meant certain figures of captive-women, dreſt after the manner of that nation, and ſerving inſtead of columns to ſupport the entablements.

Car-tooſes-touzes, in architecture, are much the ſame as modillions; only theſe are ſet under the cornice in wainſcotting, and thoſe at the eves of a houſe.

Cartouche, Perrault ſays, it is an ornament of carved work, of no determinate form, whoſe uſe is to receive a motto, or inſcription, the word being borrowed from the Italian *Cartoccio*.

Cartridges, in architecture, are the ſame as *Cartoozes*

Caſe of *Glaſs*, a caſe of crown glaſs contains twenty-four tables, each table being circular, or nearly ſo, and about three feet ſix inches, or three feet eight inches diameter.

Caſement, in architecture, is a hollow moulding. Some architects make it ⅙ of a circle, others ¼. Alſo an iron frame to windows is ſo called.

Caſt, (among workmen) a piece of timber, or a board, or the like, is ſaid to caſt, or to be caſt, when (by its own drought or moiſture, or by the drought or moiſture of the air, or other accident) it alters its flatneſs and ſtraitneſs, and becomes crooked.

Catadrome, a kind of engine, like a crane, which builders uſe in lifting up, and letting down any great weights.

Catheta, a perpendicular, or plumb line, falling from the extremity of the under ſide of the cimatium (of the Ionic capital) through the centre of the volute.

Cavetto, a round concave moulding, which has a quite contrary effect, to the quarter-round; the workmen call it *mouth*, when in its natural ſituation, and *throat* when turned upſide down.

Cavazion, a term of architecture, ſignifying the under-digging, or hollowing of the earth, for the foundation of a building. Palladio ſays, it ought to be the ſixth part of the height of the whole building.

Caulicoli, the carved ſcrolls (under the abacus) in the Corinthian capital.

Ceiling, in architecture, is the lathing and plaiſtering at the top of a room, upon the under-ſide of the joiſts of the next room.

Cement, in architecture, is a ſtrong, ſticking, cleaving, or binding mortar, of which there are two ſorts, *viz.* cold cement, or hot cement.

Chambers, in a houſe or building, are the rooms btween the ground ſtory and garrets, ſo there are in ſome buildings two or more ſtories of chambers.

Channel, (in the Ionic capital) is that part which is under the abacus, and lies open upon the echinus, or eggs, which has its centers or turnings on every ſide, to make the volutes. Alſo the ornamental part of the Doric trigliphs, and the paving in the middle of a ſtreet, *&c.* are ſo called.

Chapiter, in architecture, ſignifies the top, or head of a pillar.

Chimney-jaumbs, the ſides of a chimney, commonly coming out perpendicularly, tho' ſometimes circularly, from the back; on the extremities of which the mantle-tree reſteth.

Chimney-pieces, certain mouldings of wood or ſtone, ſtanding on the fore-ſide of the jaumbs, and coming over the mantle-tree.

Chord, is a line in a circle connecting the two ends of any arch.

Cima recta, or *cimaiſe*, from the Greek *kymation*, a wave, called by Engliſh workmen *ogee*, which is of two kinds; *viz. cima recta* and *cima* reverſe, or the back ogee, whoſe beauty conſiſts in having its height and projecture equal to each other.

Cincture, is a liſt, or fillet, at the top or bottom of a column; that at the top is ſometimes called *colier*, and ſometimes *annulus*.

Cilery, a term in architecture, ſignifying the drapery or leafage that is wrought upon the heads of pillars.

Ciſterns, are veſſels made to ſerve as receptacles for rain or other water, for the neceſſary uſes of a family.

Circle, is a plain figure, comprehended under one only line, called its

Circumference, whence all the lines drawn to its centre are equal to one another.

Circumferentor, the name of an inſtrument for ſurveying land.

Clamp, a clamp is a kiln, built above ground, for the burning of bricks. Alſo pieces on the ends of ſhutters, tables, &c. are ſo called.

Clinkers, thoſe bricks are ſo called by ſome, which, by the violence of the fire are run, and are glazed over.

Cloiſter, a cloſe and ſeparate habitation, where friers, nuns, and monks live retired from the world: Alſo, a long place, covered with a floor, or platform, ſupported by pillars.

Coins. See *Quoins*.

Collar-beam, a beam framed croſs betwixt two principal rafters.

Coloſſus, this is applied to any figure that is far greater than the life; alſo, a building is called a *coloſſus*, when of extraordinary bigneſs; as the ancient amphitheatres, the pyramids of Egypt, &c.

Column, is a round pillar, compoſed of a baſe, a fuſt or ſhaft, and a capital, and ſerves to ſupport the entablement.

Compartition, by this term architects underſtand a graceful diſtribution of the whole ground-plot of a building, into rooms of office, and of reception or entertainment.

Compartment, in architecture, is a particular ſquare, for an inſcription, or ſome other device, marked out in ſome ornamental part of a building.

Concamerate, to make an arched roof, as in vaults, &c.; to arch over.

Concave, hollow; and concavity is the hollowneſs of any thing.

Concentric, figures that have the ſame common centre.

Conclave, in architecture, is a cloſet, or inner chamber.

Conduits, ſewers, or gutters, to convey away the ſuillage of a houſe.

Cone, a Latin word, a geometrical figure, of a pyramidical form like a ſugar-loaf.

Conges in architecture, are the rings or ferrils heretofore uſed in the extremities of wooden pillars, to keep them from ſplitting; afterwards imitated in ſtone-work.

Conſole, to cloſe up in any ornament cut upon the key of an arch, which has a projecture or jetting, and, on occaſion, ſerves to ſupport little cornices, figures, buſts, and vaſes. It is a French word.

Contour, the outline of any member in architecture; as that of a baſe or cornice, or the like; a French word.

Contignation, a ſtory in building. In Latin, *contignatio*, ſignifies the laying of rafters together.

Contramure, in architecture, is an out-wall, built about the wall of a city.

Copeing of walls, is the top or cover of it, made ſloping to carry off the weather.

Corbeilles, a French word, ſignifying a baſket, is a piece of carved work, in the form of a baſket full of flowers or fruits, ſerving, in architecture, to finiſh ſome ornament.

Corbel-bet bil, a ſhouldering piece in timber-work, jutting out like a bragget.

Corbel, holes left in the walls of ancient churches, &c. for images to ſtand in.

Cornice, comes from the French *corniche*, and makes the third and uppermoſt member of the entablement, which is different in the ſeveral orders. The word *cornice*, however, is applied to every prominent or jetting member that crowns any body; and thus we ſay, *The cornice of a pedeſtal*, and the like. Cornices are alſo placed on the top of wainſcot, and under the eaves of houſes, &c.

Corona, *coronice*, or *crowning*, theſe words are indifferently applied to any thing that finiſhes an ornament in architecture; as, for inſtance, to a cornice or pediment, &c. *Block-cornices*, are ſuch as have a kind of plain modillion without any caps under the *corona*.

Coving-cornice, which has a great caſement, or hollow in it, which is commonly lathed and plaiſtered upon compaſs, ſprockets, or brackets.

Coveings, or *corner ſtones*, are thoſe ſtones on the ſides or jaumbs of a chimney; they are generally of rigate or fire-ſtone, and their faces are hollow in breadth: In grand buildings they are of marble.

Couſſnet, the firſt ſtone whence a vault or arch commences is ſo called.

The little cornice or plinth that crowns the pier, and ſupports the couſſnet, is called *impoſt*.

Crown, as *corona*.

Crown-poſt, is that poſt which, in ſome buildings, ſtands upright in the middle, between two principal rafters, from which there goes ſtruts or braces to the middle of each rafter. It is alſo called a *king-piece*, or *joggle-piece*.

Cubicle, a bed-chamber.

Culinary, of, or belonging to the kitchen.

Culvertail, as dove tail.

Cupola in architecture, is a ſmall room, either circular or polygonal, ſtanding on the very top of a building; ſome call it a *lanthorn*.

Cy mace-macium, as *cimatium*.

D

DADO, or *die*, the plain part of the pedeſtal.

Decor, or, more properly, *decorum*; this word is perfect Latin, and ſignifies the keeping of a due reſpect between the inhabitant and habitation.

Denticles, ornaments in a cornice, cut after the manner of teeth, (from *dens*, a tooth.) Theſe are particularly affected in the Corinthian Order; and the ſquare member, wherein they are cut, is called the *denticle*, in Latin *denticulus*.

Diaſtyle, an edifice where the columns are placed at the diſtance of three of the diameters from one another.

Die, this term is applied to any ſquare body; as the trunk or naked part of a pedeſtal, which is that part included between the baſe and cornice thereof.

Diptere, among the ancients, a kind of temple, or other edifice, encompaſſed round with a double row of columns; it ſignifies, in Greek, *two winged*. The pſeudo (or falſe) diptere was the ſame; excepting, that, inſtead of the double row of columns, this was only encompaſſed with a ſingle one

Dome, alſo a cupola, a round piece of architecture, reſembling the bell of a great clock, ſet upon the top of a building, particularly upon cathedral-churches, where it ſometimes ſerves for the bell-tower. The dome of St Paul's is well known.

Dorman-tree, in architecture, is a great beam lying croſs a houſe; otherwiſe called a *ſummer*.

Dormer, in architecture, is a window made in the roof of a houſe, it ſtanding upon the rafters.

Doucine. See *Cima*. It is an upright O—G.

Dove-tails, a ſort of joints or hinges, ſo called, becauſe they reſemble the tail of a dove or pigeon.

Dove-tailing, among workmen, is a manner of faſtening boards, or any timber, together, by letting one piece into another, in the form of a dove's tail.

Drag, with workmen, a door is ſaid to drag, when, in opening and ſhutting, it ſtops upon the ground or floor.

Dragon-beam, Dragon-beams are two ſtrong braces, or ſtruts, that ſtand under a breſſummer, meeting in an angle upon the ſhoulder of the king-piece.

Drapery, a term in architecture and painting, it being a work wherein clothes are repreſented: Alſo as *cilery*.

Drip, this is called *larmier* in French, and is the bottom of the *corona*; becauſe the rain-water is, by means thereof, forced to fall drop by drop on the ground, dripping like tears.

Draught, or *deſign*, is the picture of an intended building, deſcribed on paper, wherein is laid down, by ſcale and compaſs, the deviſed diviſions and partitions of every room, in its due proportion to the whole building.

Drips, in architecture, are a certain kind of ſteps, made on a flat roof, to walk upon, a way of building much uſed in Italy; the roof is not quite flat, but a little raiſed in the middle; and thoſe ſteps or drips lie each a little inclining to the horizon.

Drops, in architecture, are, an ornament of the Doric Order, underneath the trigliphs, repreſenting drops, or little bells.

E

EAVES, is the margin of the roof of a houſe, *viz* that part of the roof that hangs over without the walls.

Echinus, is ſometimes uſed to ſignify the quarter round; but more commonly that part of it which includes the *ovum*, or egg; it comes from the Greek, *echinus*, the ſhell of a cheſnut.

Eggs. See *Anchors* and *quarter-rounds*.

Elaboratory, a place to work in; properly a chymiſt's work-houſe or ſhop.

Emboſſing, in architecture, is a kind of ſculpture or engraving, wherein the figure ſticks out from the plane whereon it is engraven, and according as it is more or leſs protuberant, is called by the Italians *baſſo*, *mezzo*, or *alto-re-*

lievo, uſed by the Engliſh, *baſs-relief*, *mean-relief*, or *high-relief*.

Embraſure, in architecture, is the enlargement that is made in a wall on the inſide of a window or gate, to give the more light, or for the more convenience of the gate or window.

Entablement, or *entablature*, by Vitruvius and Vignola, is called *ornament*, and ſignifies the architrave, the freeze, and the cornice together; it is likewiſe called *trabiation*, and is different in the different orders. The word ſeems borrowed from the Latin, *tabulatim*, a ceiling; becauſe we ſuppoſe the freeze to be formed by the ends of the joiſts which bear upon the architrave.

Enterſole, ſometimes called *mezanine*, is a kind of low ſtory, at the top of a building, for lodging ſervants, &c.

Entry, in architecture, is a room deſigned only, or chiefly, for paſſage to and fro, betwixt other rooms, or from the outer-door into the houſe.

Epiſtyle-tylium. As *freeze*.

Eurithimia, a term of architecture uſed by Vitruvius, by which he intends only that agreeable harmony, that ought to be between the length, breadth, and height of each room in a fabric.

Euſtyle, is the beſt manner of placing columns, with regard to their diſtance, which Virtruvius made to be two diameters and a quarter; the word is compounded of *eus*, good, and *ſtylos*, a column.

Eyebrow, as liſt or fillet. See *Capital*.

Eye, in architecture, is the middle of an Ionic volute or ſcroll, cut in the form of a roſe.

F

FABRIC, a church, a houſe, or any other building.

Face, in architecture, is any member that has a great breadth, and but ſmall projecture; as the architrave in the front of a building.

Face of a ſtone, by which workmen mean that ſuperficies or plain of the ſtone that is to lie in the front.

Facia, or *faſcia*, Mr Perrault ſays, it ſignifies any flat member; as the bands of an architrave, &c. There are ſome who write it *faſce*, grounded upon a Latin word *facia*, a large riband, which Vitruvius makes uſe of on the like occaſion.

Feather-edged, boards or planks that are thicker on one edge than on the other.

Felling of timber, the proper ſeaſon uſually commences about the end of April, becauſe then the bark riſes moſt freely; and if there be a quantity to be felled, the ſtatute obliges to fell it then, the bark being ſo uſeful for the tanners.

Fence-walls, walls of brick or ſtone, made round yards, &c. See *Walls*.

Feſtoon, an ornament of carved work in the manner of a wreath, or garland of flowers or leaves twiſted together, thickeſt at the middle, and ſuſpended by the two extremes, whence it hangs down with a graceful ſweep.

Fillet is any little ſquare moulding, which accompanies or crowns a larger.

Fire-ſtone, Rigate ſtone, called *fire-ſtone*, is a ſort of ſtone very good, and much uſed for chimney fire-hearths, ovens, ſtoves, &c.

Flemiſh bricks, are a ſort of bricks brought out of Flanders, and uſed for paving; being much neater and ſtronger than common or clay-bricks: they are of a yellowiſh colour; and each brick is 6¼ inches long, 2½ inches broad, and 1¼ inches thick.

Floating, a term uſed by plaiſterers for their beſt ceilings.

Floors, a floor, in architecture, is the bottom part of a room, on which we walk. Floors are of ſeveral ſorts; ſome are of earth, ſome of bricks, ſome of ſtone, and ſome of wood. Carpenters, by the word *floor*, underſtand as well the framed work of timber, as the boarding over it.

Fluſh, a term uſed by carpenters when the work is even or ſmooth; alſo, in maſonry, it ſignifies the breaking off of any part of the ſtone.

Flutes, or *fluteings*, in architecture, are the hollows made in the body of a column; the Doric, Ionic, Corinthian, and Compoſite columns, are commonly fluted, or made with flutes, or hollows, running along the body of the column, from the baſe to the capital.

Flyers, are ſtairs made of an oblong ſquare, whoſe fore and back ſides ſtand parallel to each other; and ſo are their ends: The ſecond of theſe flyers ſtand parallel behind the firſt, the third behind the ſecond; and ſo of the reſt. If one flight carry them not to the intended height, then there is a broad half-pace, from whence they begin to fly again as at the firſt.

Foliage, in architecture and ſculpture, is work wrought in branches and leaves.

Foot-pace, or, as ſome call it, *half-pace*, is a part of a pair of ſtairs, whereon, after four, ſix, or more ſteps, you arrive to a broad place, where you may take two or three paces before you aſcend another ſtep, thereby to eaſe the legs in aſcending the reſt of the ſteps.

Foundation, the loweſt part of a building, generally laid under ground, upon which the walls of the ſuperſtructure are raiſed. This word is alſo ſometimes taken for public buildings erected for pious uſes.

Fountain, an artificial ſpring of (or well to contain) water in a garden, whether the water is brought in pipes of lead, &c. and commonly made to ſpout out of the mouths or other parts of images.

Framing of a houſe, is the carcaſe, flooring, partitioning, roofing, ceiling, beams, aſhering, &c. and indeed all that is done by the carpenter.

Freeze, or *frieſe*, a large flat member, which ſeparates the architrave from the cornice. See its etymology under the word *Zophoros*.

Freſco, a way of painting or plaiſtering, or rather both, upon walls, to endure the weather, and repreſenting birds, beaſts, herbs, fruits, &c in relief.

Frett-work, a plain bordering round ceilings, picture frames, &c. being made with divers fillets or bands, and affording a great variety of figures by their turnings.

Frigeratory, a place to make or keep things cool in.

Front, or *frontiſpiece*, the face or fore-ſide of a houſe. See *Portal*.

Frowey, timber is ſaid to be frowey, when it is evenly tempered all the way, and works freely without tearing.

Funnels of chimnies, is the ſhaft, or ſmalleſt part of them (where they are gathered into their leaſt dimenſions) upwards.

Furrings, among workmen, is the making good of the rafters feet in the cornice; that is, when rafters are cut with a knee, theſe furrings are pieces that go ſtrait along with the rafter, from the top of the knee to the cornice: Alſo, when rafters are rotten, or ſunk hollow in the middle, and pieces cut thickeſt in the middle, and, to a point at each end, are nailed upon them to make them ſtrait again; the putting on of thoſe pieces is called *furring the rafters*; and thoſe pieces ſo put on, are called *furrings*. The ſame term is uſed for *joiſts*, which being, by time, ſunk hollow in the middle, are furred up ſtrait.

Fuſt, from the Latin *fuſtis*, a club, ſignifies the trunk or ſhaft of a column, being that part comprehended between the baſe and the capital.

G

GABLE-END, in architecture, the gable-end of a houſe is the upright triangular end of the roof.

Gain, the bevelling ſhoulder of the joiſt, or other ſtuff, is ſaid to gain by being longer.

Galleries, are long narrow rooms, made on the ſides or fronts of houſes; they ſerve for walking, eating, and other divertiſements.

Gard-manger, from the French a ſtore-houſe, or room to ſet meat in.

Gavel, a word uſed by ſome, by which they mean the ſame as *gable*.

Girding-beams, is uſed by ſome workmen to ſignify the ſame as

Girders, are ſome of the largeſt pieces of timber in a floor; the ends of them are, for the moſt part, framed into ſummers, or breaſt-ſummers; and the joiſts are framed in at one or both ends, to the girders.

Glaſs, a tranſparent body, made by art of flints, ſand, and aſhes; and of this there are many ſorts; as *crown glaſs*, *French* or *Normandy glaſs*, *German glaſs*, *Newcaſtle glaſs*, *Briſtol glaſs*, *looking glaſs*, and *jealous glaſs*; which laſt is of that nature that it cannot be ſeen thro', yet it admits of the light thro' it.

Gothic architecture, is that which is far removed from the manner and proportions of the antique, having its ornaments wild and chimerical, and its profiles incorrect.

Gradatory, is derived from the Latin, and is uſed to ſignify a place to which we go up by ſteps, particularly an aſcent from the cloiſter to the choir in ſome churches.

Grainery, a place to lay up corn in.

Grange, a French word, ſignifying a building which hath barns, ſtables, ſtalls, and other neceſſary places for huſbandry.

Ground-plat, or *plot*, a piece of ground which a building is to be erected upon.

Groove, a term uſed by joiners, to ſignify the channel that is made by their plough in the edge of a moulding, or ſtile, or rail, &c. to put their pannels in, in wainſcotting.

Guttering, in carpentry, is the boarding and bearers to lay the lead on in the fronts or middle of the roof.

Gutter-tiles, are in form, as they appear at a diſtance, a kind of a triangle, having one ſide convex; but this is whilſt they are flat and plain, before they are bent fit for uſe.

H

HAIR, the hair here mentioned is bullock's hair, ſuch as is uſed in mortar for plaiſter.

Hangs-over. See *Batter*.

Headers, a term among bricklayers, when bricks are laid end-ways in a wall; but when lengthways, they call them *ſtretchers*.

Heads, a term uſed by bricklayers, by which they mean half a tile in length, but to the full breadth of a tile; theſe they uſe to lay at the end of a roof.

Healing, by this word is underſtood the covering of the roof of any building, which is of various kinds; *viz.* 1. Lead. 2. Tiles. 3. Slate. 4. Horſham ſtone. 5. Shingles. 6. Reed. 7. Straw.

Heel, an inverted ogee.

Helix, or *urilla*, is a little volute caulicole, or ſtalk, under the flower of the Corinthian capital.

Hinges, are thoſe neceſſary appendages by which all doors, all lids of boxes, cheſts, trunks, &c. make their motion, either of opening, ſhutting, or folding.

Hips, are thoſe pieces of timber which are at the corners of a roof; they are a great deal longer than the rafters, by reaſon of their oblique poſition, and they are placed, not with a right or ſquare angle, but a very oblique one; and, by conſequence, they are not (or at leaſt ought not) to be ſquare at any angle, as rafters are, but bevel at every one of them; and, which is yet more, as rafters have but four plains, theſe commonly have five: They are by country-workmen uſually called *corners;* and ſome call them *principal rafters*, and others *ſleepers;* the truth is, hips and ſleepers are almoſt the ſame; only the ſleepers lie in the vallies, and join at the top with the hips; but thoſe ſurfaces or plains, which make the back of the hip, are the under ſide of the ſleeper.

Hollow, a term in architecture, by which is meant a concave moulding, being about a quadrant of a circle; by ſome it is called a *caſement*, by others an *abacus.*

Horſham-ſtone, is a kind of thin broad ſlate, of a greyiſh colour, much uſed in ſome parts of Suſſex, not only to heal or cover churches and chancels, but ſome great houſes alſo.

Houſe, a habitation, or place built with conveniencies to ſhelter a man's perſon and goods from the inclemencies of the weather and the injuries of all ill-diſpoſed perſons.

Houſing, a term uſed by ſome bricklayers; for when a tile or brick is warped, or caſt crooked or hollow in burning, they then ſay, *Such a brick, or tile, is houſing.* Tiles are apt to be houſing, or hollow, on the ſtruck ſide, or that which was upmoſt in the mould, and bricks on the contrary ſide.

Heperthyron, a Greek word, ſignifying the lintel or cap-piece of a door-caſe.

Hypotrachelium, or *hypotrachelion*, the ſame as *freeze.*

I

JAUMBS, door-poſts; alſo the upright poſts at the ends of window-frames and chimnies are ſo called. *Jambe* is a French word, and ſignifies a leg.

Ichnography, a deſcription or draught of the platform or ground-work of a houſe or other building.

Impoſt, is a term in architecture, which we underſtand to be the capitals of pilaſters, that ſupport arches. It comes from the Italian, *impoſto*, ſurcharged, or burdened with, or laid upon; take it either way, the name expreſſes the thing.

Indigo will grind very fine, and lie with a good body, and is much uſed in painting, &c.

Intercolumniation, is the ſpace between two columns, which, in the Doric Order, is regulated according to the diſtribution of ornaments in the freeze; but, in the other orders, according to Vitruvius, is of five different kinds; *viz picnoſtyle, ſiſtyle, euſtyle, diaſtyle*, and *arcoſtyle.* This the Latins expreſs by their word *intercolumnium.*

Interduces, in architecture, are thoſe ſmaller pieces of timber that lie horozontally betwixt the ſummers, or betwixt them and the ſill or raiſing.

Joiſts, in architecture, are thoſe pieces of timber, framed in the girders and ſummers, on which the boards of the floors are laid.

Juffers, a term uſed by ſome carpenters, for ſtuff about four or five inches ſquare, and of ſeveral lengths. Alſo *quarters.*

K

KERF, the ſawn away ſlit in a piece of timber or board; the way made by the ſaw is called a *kerf.*

Knee, a piece of timber cut crooked with an angle is called a *knee piece*, or *knee-rafter.*

L

LABORATORY. See *Elaboratory.*

Laths for building are long, thin, and narrow ſlips of wood uſed in tyling or ceilings, and are of three ſorts; *viz.* heart of oak, ſap-laths, and deal-laths.

Lead, is a material uſed in buildings for flats, gutters, pipes, ciſterns, ſinks, &c. and is well known; ſo needs no deſcription.

Lintels, in ſtone and brick buildings, are the pieces of timber that lie horizontally over the tops of doors and windows.

Liſt, and *liſtella*, is a little ſquare moulding, ſerving to crown or accompany a larger, or, on occaſion, to ſeparate the fluteings of a column.

It is ſometimes called a *fillet*, and ſometimes a *ſquare*. It comes from the Italian word *liſta*, any kind of liſt or ſelvage: Alſo, a board is ſaid to be *liſted* when the ſap on the edges is ſawn away.

Lobby, as *antichamber*.

M

MANTLE, in architecture, is the head-piece on the jaumbs of a chimney-piece, either of ſtone, wood, or the like.

Marble, is a kind of ſtone, extremely hard, firm, and ſolid, dug out of pits and quarries; it takes a beautiful poliſh, and is much uſed in ornaments of fine buildings; as columns, ſtatues, chimney-pieces, &c.

Of this ſtone there is many kinds; as *black* and *white marble*, *purple marble*, *Egyptian marble*, *black* and *yellow marble*, *ſtatuary marble*, &c.

Maſonry, is a branch of architecture, conſiſting in the art of hewing, ſquaring, and moulding of ſtones for the uſe of building; or may be underſtood for the aſſembling and joining ſtones together with mortar.

Membretto, a pilaſter that bears up an arch.

Metops, is the ſquare interval between the trigliphs of the Doric freeze, which, among the ancients, uſed to be adorned with the heads of beaſts, baſons, vaſes, and other inſtruments uſed in ſacrificing.

The beauty of theſe metops conſiſt in their regularity, that is, in their being perfect ſquares; and yet, when they are really ſquare, they appear to be leſs in height than in breadth; which is owing to the projecture of the little bandelet, wherein they terminate underneath, that hides a ſmall part of their height; for this reaſon M. le Clerc is for making the metops a minute or two more in height than in breadth; being of opinion they ought rather to appear ſquare, without being ſo, than really be ſquare, without appearing ſo.

Minute, is uſually the ſixtieth part of a module.

Mitchels, Purbec ſtones for paving, picked all of a ſize, from fifteen inches ſquare to two foot.

Model, in architecture, is particularly uſed in building for a pattern made in wood, ſtone, clay, or other matter, with all its parts and proportions in ſmall, in order to give an idea of the effect it will have in large, when executed.

Modern, this word, in its genuine meaning, is only applicable to ſuch architecture as partakes partly of the Gothic, retaining ſomewhat of its delicacy and ſolidity; and partly of the antique, whence it borrows members and ornaments, without any proportion or judgment.

Module, a meaſure made uſe of to regulate the proportions of the ſeveral members of columns: In all the orders it is the whole diameter. A module is commonly ſuppoſed to be divided into ſixty equal parts, called *minutes*; module comes from *modulus*.

Modillions, in Italian *modiglioni*, (a ſort of cantalivers,) are little inverted conſoles under the ſoffit, or bottom of the drip, in the Ionic, Compoſite, and Corinthian cornices, and ought to correſpond to the middle of the columns. Theſe are particularly affected in the Corinthian Order, where they are always enriched with carved work. In the Ionic and Compoſite, they are more ſimple, having ſeldom any ornament, excepting ſometimes a ſingle leaf underneath. In Latin they are called *mutuli*.

Moreſk-work, a kind of antic-work, in painting and carving, after the manner of the Moors, (whence it has its name,) conſiſting of ſeveral groteſcoes, wherein there is no perfect figure, either of men or other animals, and wherein there is a wild reſemblance of birds, beaſts, trees, &c. intermingled.

Mortar, in architecture, is a preparation of lime and ſand, mixed with water, ſerving as a cement, and is uſed by maſons and bricklayers in building; and to a rod of brickwork is required a hundred and a half of lime, and two load of ſand; and for tiling, four buſhels of lime, and ſix or eight buſhels of ſand, will be ſufficient for laying a thouſand of tiles, which is about a ſquare and ½; ſo that a ſquare of tiling will require about 2⅔ of lime, and about five buſhels of ſand

Moſaique, or *Moſaical work*, is a curious kind of work, conſiſting of ſmall inlaid pebbles, cockles, and ſhells of ſundry colours; and, of late, likewiſe with pieces of glaſs figured at pleaſure.

Mouldings, under this name are comprehended all thoſe jettings, or projectures, beyond the naked of a wall, column, &c. which only ſerve for ornament; whether they be ſquare, round, ſtrait, or crooked. Of theſe there are ſeven kinds, more conſiderable than the reſt; *viz.* the doucine, or *cima recta*; the talon, or heel; the ovolo, or quarter round; the plinth, aſtragal; the denticle, and the cavetto.

Munions, in carpentry, are the ſhort upright poſts that divide the ſeveral lights in a window frame.

Muniment room, a place for the keeping of ſeals, charters, evidences, &c.

N

NAILS, in building, are ſmall metaline members, well known; but they are very numerous in their ſorts, as has been ſhewn in this treatiſe. The number required for lathing is about 500 to a bundle of five-foot laths, and 600 to a bundle of four-foot laths, at ſixſcore to the hundred; and for flooring is required 200 to a ſquare. Nails are made tough by heating them in a fire-ſhovel, or the like, and putting ſome tallow or greaſe on them

Newel, the upright poſt that a pair of winding ſtairs turns about.

Niches, the hollow places in a wall, wherein ſtatues are ſet.

Noſeings, are parts in the ſides of a marble chimney-piece; alſo the egdes or front parts of ſteps, or at the foot of a cove, &c.

O

OBELISK, is a quadrangular pyramid, very tall and ſlender, raiſed in a public place, to ſerve as a monument of ſome memorable action.

Og, *ogee*, or *orgive*, a ſort of moulding, in architecture, conſiſting of a round and a hollow, like an S.

Optic glaſſes, are thoſe that are ground either concave or convex, ſo as to collect or diſperſe the rays of light; by means of which *viſion* is improved, and the eye ſtrengthened, preſerved, &c.

Oratory, in architecture, is a cloſet or ſmall apartment near a bed-chamber, furniſhed with a little altar or image for private devotion among the Romaniſts.

Orders, in architecture, are the different forms and proportions of columns, &c. There are five orders commonly reckoned in architecture; *viz.* the *Tuſcan*, *Doric*, *Ionic*, *Corinthian*, and *Compoſite*.

Orlo, the plinth or ſquare under the baſe of a column, or under the baſe of its pedeſtal.

Ornaments, by which is underſtood all the ſculpture or carved work, wherewith a piece of architecture is enriched.

Orthography, in architecture, ſignifies the front or (any other) upright ſide of a houſe; or the draught on paper of thoſe parts of a houſe.

Ovolo, as *echinus*.

P

PAINTING, a work in building, well known; for the particulars of which, ſee the foregoing treatiſe on ditto.

Paliſade, or *Paliſado*, is an open fence either of wood or iron, for the diſplaying of the proſpect of a houſe, garden, &c.; or in fortification.

Palliſication, a term in architecture, ſignifying the piling of the ground-work, or ſtrengthening of the ground-work, with piles of timber driven into the ground, when they build upon a moiſt and marſhy ſoil.

Pannel, in joinery, is a ſquare piece of thin wainſcoting, ſometimes carved and framed, or grooved in between thicker pieces.

In maſonry, is one of the faces of a hewn ſtone.

Pantheon, in architecture, is a temple or church of a circular form, dedicated to all the gods, or all the ſaints.

Pantry, a room for the keeping of victuals; a ſtore room.

Parallel-ruler, is an inſtrument of wood and braſs for drawing of parallel lines.

Parapet, from the Italian *parapetto*, a ſave-breaſt, is a little wall, or ſometimes a rail, ſerving either as a reſt for the arm, or as an encloſure about a key, bridge, terraſs, &c.

Paraſtatæ, pilaſters which ſtand alone, not adjoining to the wall, and which the French call *iſolees*, or *inſulate*, from *inſula*, an iſland, as we take it.

Pargetting, in architecture, ſignifies the plaiſtering of chimney-funnels; ſometimes it is uſed to ſignify the plaiſter itſelf.

Parlour, a fair lower room, deſigned for the entertainment of company.

Paſſage, an entry or narrow place, ſerving for a thorough-fair into other rooms.

Pavement, a lay of ſtone, brick, or other matter, ſerving to ſtrengthen the ground of divers ſtreets, or other places, for the more commodious walking thereon.

Pediment, in French *fronton*, from the Latin *frons*, the forehead, is an ornament that crowns the ordonance, finiſhes the fronts of buildings, and ſerves as a decoration over gates, windows, chines, &c. It is ordinarily of a triangular form; but ſometimes makes an arch of a circle. Vitruvius calls it *faſtigium*.

Pedeſtal, is a ſquare body with a baſe and cornice, ſerving as a foot for the columns to ſtand upon; and having, according to Vignola, the third part of the height of its column. It is varied in the different orders.

Pedemints, are the crowning frequently ſeen over gates, doors, windows, and niches, and ſometimes over entire orders of architecture. The ridges of houſes were what gave architects the firſt idea of this noble part.

Pentadoron, a kind of bricks ſo called.

Perquitting, a floor laid, or compoſed of divers ſmall figures; as ſquares, rhombs, &c.

Periptere, in the ancient architecture, is a building encompaſſed round with columns. The word comes from the Greek *peri*, about, and the *pteron*, a wing.

Perrons, are ſteps raiſed before the doors of great houſes.

Perſian Order, is that which has figures of Perſian ſlaves, to ſupport the entablement inſtead of columns; as the Cariatic Order has the figures of women ſerving for the ſame purpoſe. The former columns are uſually like robuſt men, with long beards; and ſuch figures are more fit to repreſent an unhappy ſlavery than thoſe of women. The character of ſlavery is expreſſed in theſe figures, either by tying their hands before, or elſe behind their backs. Columns of this kind may very properly be uſed in a gallery of arms, &c. princes palaces; in which caſe they may be made gigantic, and their entablature Doric.

Piazza, in architecture, commonly called *piache*, an Italian name for a portico; it ſignifies a broad open place or ſquare, whence it became applied to walks or porticoes of pillars around them; like thoſe of Covent-Garden, the Royal Exchange, &c.

Piedroit, in architecture, is a ſquare pillar, that is partly within the wall.

Pillar, is a kind of round column, diſengaged from any wall, and made without any proportion, being always either too maſſive, or too ſlender; ſuch are the pillars which ſupport the walls of Gothic buildings: in Latin they are called *pilæ*.

Pilaſters, in architecture, are a kind of half columns, ſtanding againſt a wall, with baſes and capitals, as columns have; but differing from columns in this, that pilaſters are ſquare, but columns round.

Pitch, by this term architects underſtand the angle a gable-end, and conſequently the whole roof of a building, is ſet to.

Platebands, the liſts of fillets, being the flutings of the Ionic, Corinthian, and Compoſite columns. They are each in breadth a quarter of the flute. *Platebands* are alſo a ſquare mould ſet at the end of an architrave of the Doric order. *Plateband*, Perrault ſays, is a ſquare moulding, having leſs projecture than height.

Platform, this word in architecture, is ſometimes uſed to ſignify the ichnography or draught of the ground-plot of a houſe; but more commonly for a broad, ſmooth, and open walk upon the top of any building. *Platform* is alſo a row of beams, which ſupport the timber work of any roof, and lie on the top of a wall, where the entablature ought to be raiſed.

Platfond, a French word for the ceiling or roof of a chamber, or other room, &c.; the ſame as *ſoffit*.

Plaſtique, or *plaſtic art*, is a branch of architecture that is not only comprehended under ſculpture, but is indeed very ſculpture itſelf; but with this difference, that the plaiſterer, by his plaſtic art, makes figures by addition, but the carver by ſubtraction.

Plinth, is derived from the Greek *plinthos*, a ſquare brick, and is, in architecture, a ſquare piece or table under the mouldings of the baſes of columns and pedeſtals.

Plumbery, an art belonging to architecture, it being the art of working in lead.

Porphyry, a fine reddiſh marble, ſtreaked with divers colours. Pliny ſays, this kind of marble comes out of Egypt, where there are large quarries of it.

Portland ſtone, is much uſed in building, and much ſofter and whiter than Purbec.

Portal, an ancient term in architecture; it was uſed to ſignify a little ſquare corner of a room, ſhifted off from the reſt of the room by the wainſcot. The word comes from the French *portail*, a gate or entrance; becauſe through it they enter into the room.

Portails, the decoration of the face or front of a church, called alſo *frontiſpiece*.

Portico, a kind of a gallery, raiſed upon arches, where people walk under ſhelter; it has ſometimes a ſoffit or ceiling; but is more commonly vaulted. Alſo, the front of a church, &c. where columns are detached from the buildings; as the weſt end of St Martin's, St Paul's, Covent-Garden, &c.

Prick-poſts and ſtiles, among carpenters, are ſuch as come in between principals.

Profile, in architecture, is a draught repreſenting the breadth, depth, and height of a fortification, or building, but not the length; which properly belongs to a plan or ground-plot; ſo that it is, in a manner, the ſame with a proſpect of a place or building, viewed ſidewiſe, and expreſſed according to the rules of perſpective in ſuch a caſe.

Project, all mouldings, &c. are ſaid to project when they jut out, or are beyond the ſuperficies.

Proportion, is the juſtneſs of the members in each part of a building, and the relation they bear to the whole.

Pudlays, pieces of ſtuff, to do the office of leavers, or hand-ſpikes.

Pulvinata, a freeze, ſwelling like a pillow.

Punchins, ſhort pieces of timber, placed under ſome conſiderable weight to ſupport it. They commonly ſtand right between the poſts; they are ſhorter and ſlighter than either principal poſts or prict-poſts: thoſe that ſtand on each ſide of a door, are called *door-punchins*.

Purlins, thoſe pieces of timber that lye acroſs the rafters on the inſide, to keep them from ſinking in, in the middle of their length.

Purbec-ſtone, is a hard greyiſh ſtone, almoſt like Suſſex petties. They are uſed for pavements.

Putlogs, pieces of timber, or ſhort poles, (about ſeven foot long,) uſed by maſons and brick-layers in building of ſcaffolds to work on. The putlogs are theſe pieces which lye horizontal to the building, one end lying into it, and the other end reſting upon the ledgers; which are thoſe pieces that lye parallel to the ſide of the building.

Pycnoſtyle, this term is uſed, when the columns are ranged ſo cloſe to one another, that the intercolumniation does not exceed a diameter and an half.

Pyramid, from the Greek, *pyr*, *fire*, or *flame*, this being pointed like that. It is a ſolid body, whoſe baſe is either ſquare, triangular, or polygonus, and which, from that baſe, diminiſhes continually to its vertex, or top.

Pyleing, the ground to foundations.

Q

QUARRY (of ſtone) a place whence ſtones are dug out, or (of glaſs) a piece of glaſs cut in a diamond form. Quarries of glaſs are of two kinds, *viz* ſquare and long; and theſe again are of different ſizes, as 8's, 10's, 12's, 15's, 18's, and 20's; that is, 8 quarries of 8's make a foot of glaſs, and ſo does 10 quarries of 10's, 12 of 12's, *&c.* But all quarries, of what ſize ſoever, are cut of one ſort of angle, for the ſquare quarries; and another for the long quarries; the acute angle of the ſquare quarries being ſeventy-ſeven degrees and nineteen minutes; and the acute angle of the long quarries, ſixty-ſeven degrees and twenty-two minutes.

Quarters, in architecture, all thoſe ſlight upright pieces between the punchins and poſts, which ſerve to lath upon, are called *quarters*.

Quarter-round, by this name the workmen call any moulding, whoſe contour is a circle, or approaching to a circle; uſing this term, wherever the architects uſe that of *egg*, or *ovolo*.

Quirk, in architecture, ſignifies a piece taken out of any regular ground-plot, or floor; as if the ground-plot were a ſquare, or an oblong, and a piece be taken out of one corner of it, for a court, or yard, that piece ſo taken out, is called a *quirk*.

Quoins, or *Coins*, the corners of brick, or ſtone walls: Alſo, the ſtones in the angles of buildings, whether plain, ruſtic, or otherwiſe.

Quadrells, a ſort of artificial ſtones, (ſo called from their form, they being ſquare,) made of a chalky, whitiſh, and pliable earth, and dried in the ſhade.

R

RAFTERS are thoſe pieces of timber, that (ſtanding by pairs, on the raiſing,) meet in an angle, at the top, and compoſe the roof of a building.

Raiſer, a board edge-ways, under the foreſide of a ſtep.

Raiſing-pieces, are pieces that lye under the beams upon brick, or timber, by the ſide of the houſe.

Range, the ſide of any work that runs ſtrait, without breaking in angles, is ſaid to range, or run range: Thus the rails of one ſtrait ſide of wainſcotting, is ſaid to run range.

Repoſitory, a ſtore-houſe, or place to keep things in; more peculiarly by architects it is uſed to ſignify ſuch places as are built for the laying up of rarities, either in painting or other arts.

Return, the ſide that falls away from the fore-ſide of any ſtrait work, is called the *return*.

Ridge, the meeting of the rafters on the top of the houſe is called the *ridge*.

Roof, the covering of a houſe; but the word is uſed, in carpentry, for the timber-work of the covering.

Roſe, is an ornament cut in the ſpaces which are between the modillions, under the platfonds of cornices, and in the middle of each face of the abacus, in the Corinthian and Compoſite capitals.

Ruſtic, a manner of building, quite rude, rather in imitation of nature, than according to the rules of art.

S

SAGITTA, in Italian, *ſagitta*, an arrow, ſignifies what we call the key-piece of an arch.

Salon, is a kind of hall, in the middle of a houſe, or at the head of a gallery or a large apartment, which ought to have a ſymmetry on all its ſides; and as its height uſually takes n two ſtories with two rows of windows, the bottom of its platfond ought to be arched; as is practiſed in ſome of the places in Italy.

Saffita, or rather *ſoffita*, or *ſoffit*, an Italian word, (from *ſubfixum* in Latin,) a ſort of ceiling. In ordinary buildings, it is taken for the boards over the tops of windows, oppoſite to the window boards at the bottom. In great edifices, it ſignifies the ceiling or wainſcot of any apartment, formed by croſs beams or flying cornices, and having the ſquare pannels of its compartments enriched with ſculpture, painting, and gilding; as we may obſerve in the baſiliques and palaces of Italy.

Sand, is a fine, hard, gravelly earth, of great uſe in building, and other works.

There are three ſorts of ſand, diſtinguiſhed by the places whence they are drawn, *viz.* pit-ſand, river-ſand, and ſea-ſand; and is a principal ingredient in making mortar.

Sawing, the application of the ſaw in dividing of timber, &c. into boards.

Scantling, the ſize that any timber is deſigned to be cut to.

Scenography, from the Greek *ſkene*, a tent or tabernacle, and *grapho*, to draw or deſcribe, is a model or deſcription of the front and ſides of a houſe, or the art of rightly contriving draughts in architecture.

Scima reverſa, an O G. with the hollow downwards. See *O G.*

Scotia, a member of architecture; it is hollow like a ſemicircle. It is particularly placed in the baſes of columns, between the torus and the aſtragal; and ſometimes it is put under the drip, in the cornice of the Doric Order. *Scotia*, from the Greek *ſkotos*, darkneſs, ſignifies, ſays M. Perrault, a hollow obſcure moulding between the torus of the baſe of a column.

Scribe, a term uſed by carpenters and joiners, when they are to fit one ſide of a piece of ſtuff, againſt the ſide of ſome other piece of ſtuff, and the ſide of the piece they are to fit it to is not regular.

Sculpture, the art of carving in wood or ſtone, &c.

Sewers, in architecture, are conduits or conveyances for the ſoilage and filth of a houſe.

Sells, in architecture, are of two kinds; *viz.* ground ſells, which are the loweſt pieces of timber in a timber building, on which the whole ſuperſtructure is erected; and window ſells commonly called *window ſoils*, which are the bottom pieces in a window-frame.

Shaky, or *ſhaken*, ſuch ſtuff as is cracked, either with the heat of the ſun, or the drought of the wind, is called *ſhaky*, or *ſhaken ſtuff*.

Shingles, are ſmall pieces of wood or quartered oaken boards, ſawed to a certain ſcantling; but they are more uſually cleft to about an inch thick at one end, and made like wedges, about four or five inches broad, and eight or nine, and in ſome places twelve, inches long. They are uſed to cover houſes; but more commonly churches and ſteeples with, inſtead of tiles or ſlates.

Shingling, the laying on of ſhingles.

Shoulder, among carpenters, is the ſides or butments of a tennon.

Skirting-boards, the narrow boards fitted round the under ſide of wainſcot againſt the floor.

Slabs, the outſide ſappy planks or boards ſawn off from the ſides of timber; alſo, the foot-pace to a chimney-piece is called a *ſlab*.

Slating, is the covering of houſes with ſlate.

Sleeper, in a roof, is the oblique rafter that lies in a gutter.

Sluices, vents or drains for water.

Solive, a French word, ſignifies a joiſt, rafter, or piece of wood, either ſlit or ſawed, wherewith the builders lay their ceilings.

Spira, is properly Latin for the fold of a ſerpent laid at reſt, or the coil of a cable-rope, &c. In architecture, it is ſometimes uſed for the baſe of a column, this making a figure not unlike thoſe.

Square, a certain meaſure, made uſe of in meaſuring ſeveral artificers works, conſiſting of a hundred ſuperficial feet.

Stairs, are of various ſorts; as ſtrait flyers, ſquare flyers, triangular flyers, French flyers, winding ſtairs, and mixt ſtairs; for which ſee p. 37, 38.

Statues, are emboſſed figures, either in ſtone, metal, or wood, repreſenting ſome perſon diſtinguiſhed by his birth or merit, &c. and either ſerving as an ornament of a palace, or expoſed in ſome public place, to perpetuate the memory of the perſon it is intended to repreſent.

Stiles, in joinery, the upright pieces that go from the bottom to the top in any wainſcot, or the like.

Stillatory, the room that a ſtill or limbec is ſet up in for diſtilling ſtrong waters.

Stilobatum, the body of the pedeſtal of any column.

Stone, is a hard, ſolid, mineral body, neither fuſible nor malleable, formed in ſucceſſion of time in the body of the earth.

Stove, a hot-houſe, for preſerving exotic plants; alſo a kitchen-term for a ſort of furnace where they prepare ragouts, &c.

Strait, a term uſed by bricklayers; it is half (or more or leſs than half) a tile in breadth, and the whole length: They are commonly uſed at the gable-ends, where theſe are laid at every other courſe, to cauſe the tiles to break joint, as they phraſe it; that is, that the joints of one courſe may not anſwer exactly to the joints of the next courſe, either above or below it.

Strings, are thoſe timbers which ſupport the ſteps of wooden ſtairs.

Stuff, the wood that joiners work upon, they call, in general, *ſtuff*.

Stylobatæ, the ſame as pedeſtals, a Greek word, from *ſtylos*, a pillar, and *baſis*, the baſe or foot thereof.

Sammer-tree, a beam, full of mortiſes for the ends of joiſts to lye in.

Symmetry, is the compariſon that runs between the parts of a building and the whole.

Syſtole, is that manner of placing columns, where the ſpace between the two firſt conſiſts of two diameters or four modules.

T

TABERN, a cellar.

Talon, the ſame as heel; a moulding in architecture.

Taper, all ſorts of ſtuff or work that is ſmaller at one end than the other, and diminiſhes gradually from the biggeſt end, is ſaid to be taper.

Tarrau, or *tarras*, an open walk or gallery; alſo, a flat roof on a houſe; alſo, a kind of a coarſe plaiſter, durable in the weather.

Taſſels, pieces of timber that lye under the ends of the mantle-tree.

Tennon, a ſquare end of a piece of timber fitted into a mortreſs.

Tetradrdon, a kind of brick ſo called.

Thatching, is the covering of the roof of a houſe or barn with ſtraw or reed.

Theatre, is a public edifice or place whereon plays or ſhews are exhibited to the people; as in Drury-Lane, Covent-Garden, or Lincoln's-Inn-fields theatres.

Thermes, or *termes*, a French word, from *Terminus*, the Roman god of boundaries or land-marks, which they uſed to repreſent in a human figure with half a body, as if it proceeded out of a ſheath or caſe; thoſe they fixed in the earth as land-marks. In architecture, they ſerve as a kind of ſymbolical column.

Thorough-lighted, rooms are ſaid to be thorough-lighted when they have windows at both ends.

Tiles, in building, are a ſort of thin artificial ſtones, uſed in the roofs of houſes, &c.; but, more properly, they are a kind of fat clayey earth, moulded together, and dried and burnt in a kiln.

There are various kinds of tiles, known by ſeveral names; as plain, thack, ridge, roof-creaſe, gutter, pan, crooked, Flemiſh, corner hip, dormar, ſcallop, aſtragal, traverſe, paving and Dutch tiles.

Timber, includes all kinds of woods, felled and ſeaſoned; or thoſe kinds of trees which, when ſo prepared, are made uſe of in building by the carpenter, joiner, turner, &c.; and which chiefly are oak, elm, beech, aſh, fir, which is alſo called *deal*; there is alſo walnut-tree, cheſnut-tree, poplar, aſpen, alder, lime-tree, &c.; but theſe are not accounted timber.

Torus, a large round moulding in the baſes of columns. The word comes from the Latin, *torus*, a bed; the figure of this moulding being not unlike that of the ſide of a quill.

Tranſom, the piece that is framed acroſs a double-light window.

Traverſe, a term in joinery, ſignifying to plain a board, or the like, acroſs the grain.

Trigliph, a term of architecture; the word is originally Greek, and ſignifies a hollow graveling, like furrows or gutters. In architecture, trigliphs are thoſe kind of ſtops, in the Doric freeze between the metops.

Trim, when workmen fit a piece into other work, they ſay they trim in a piece.

Trimmers, in architecture, thoſe pieces of timber framed to the joiſts, againſt the ways for chimnies and well-holes for ſtairs.

Trunk, from the Latin *truncus*, ſignifies the fuſt or ſhaft of a column, and the die of a pedeſtal; and is alſo uſed for bringing down water from the houſe-top.

Tuſk, a bevel ſhoulder, made to ſtrengthen the tennon of the joiſt, which is let into the girder.

V

VALLEYS, the gutters over the ſleepers in the roof of a building.

Vault, is a piece of maſonry, arched without-ſide, and ſupported in the air by the artful placing of the ſtones which form it, its principal uſe being for a cover or ſhelter; few houſes in modern buildings are without them.

Veſtible, among the ancients, was a large open ſpace before the door, or at the entry of a houſe, which they call *atrium populatum et veſtibulum*, being dedicated, as Martinus tells us, to the goddeſs Veſta, whence he will have the word derived, i e *veſtæ ſtabulum*; it being uſual for people to ſtop here before they went within doors.

Under pinning, by this term is meant the bringing it up with ſtone or brick under the ground-ſells of a building.

[illegible], from [illegible], to fold, is one of the principal ornaments of the Ionic and Composite capitals, representing a kind of bark wreathed or twisted into a ſpiral ſcroll.

Urn, comes from the Latin, *urna*, a veſſel to draw water in, and ſignifies a low wide vaſe, ſerving as a crowning over balluſtrades, and as an attribute to rivers, river-gods, &c. in the grottoes and fountains in gardens.

Vouſſoirs, the ſtones that form the arch; a French word.

W

WAINSCOT, the pannelled work round about the walls of a room.

Wainſcotting, the making and ſetting up of wainſcot.

Walling the making of walls, of what kind ſoever, is called *walling*

Waſh-houſe, a room to waſh in.

Water-table, in ſtone or brick-walls, is a ſort of ledge left out of the wall, ſome eighteen or twenty inches, more or leſs, above the ground; at which place the thickneſs of the wall is abated, or taken in on each ſide, the thickneſs of a brick, in brick walls, namely, two inches and a quarter, thereby leaving that ledge, or jutty, that is called a *water-table*.

Weather boarding, a term in carpentry, ſignifying the nailing up of boards againſt quarters.

Weather-tiling, is the tiling the upright ſides of houſes.

Well-hole, the ſpace left in a floor for the ſtairs to come up through.

Withs, theſe are uſed by thatchers to bind their thatching-rod to the rafters.

X

XYSTOS, among the ancient Greeks, was a portico of uncommon length, either covered or open, wherein the Athletæ uſed to exerciſe themſelves in running races and wreſtling. The word is derived from *xythin*, to poliſh.

Z

ZOCCOLO, the ſame as plinth; it is an Italian word, and ſignifies a ſort of wooden ſhoes or ſandals, from the Latin *ſoccus*, the buſkins wore by the ancient actors. In architecture, it is a ſquare body, leſs in height than breadth, and placed under the mouldings of the baſes of pedeſtals, &c. It is called in Engliſh, *ſocle*, or *zocle*.

Zophoros, the ſame as freeze, a large flat member which ſeparates the architrave from the cornice. It is derived from the Greek, *zoophoros*, i. e. animal bearing; it being uſual for animals to be repreſented upon it.

F I N I S.

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